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ON THE ACTIVITY OF TELESCOPIC METEORS AND SOME RELATED PROBLEMS

CONTENTS

Appendix

1. Introduction

The changes of activity of telescopic meteors consist of two different components:

I. The periodic variations with the changing position of the apex (including the so called daily and yearly variations).

II. The non-periodic and irregular variations due to the occurence of telescopic meteor showers.

The former component is a result of capturing the meteors by the moving Earth. For a long time these variations have been taken for a direct indicator of heliocentric velocities and for an evidence of the interstellar origin of sporadic meteors. Nowadays this problem has not lost its significance, though elliptic velocities for at least a great majority of meteors have been already established by direct methods: photography and radar. The rate of concentration of sporadic radiants to the apex and the resulting changes of activity in fact depend upon the manner of conversion of kinetic energy at different geocentric velocities and upon the proportion of direct meteor orbits to retrograde ones, which problems are wanted for further investigations.

The latter component is substantial for the studies on the origin and evolution of meteor streams. There are different signs in favour of the opinion that the luminosity functions valid for individual showers principally differ from that which is valid for the sporadic meteors, and that the number of faintest meteors in certain showers is unexpectedly low.

The main task of the present study was to establish the share of the two components in a direct statistics of telescopic meteors.

2. *The Observations*

The data treated in the present paper have been deduced from telescopic observations of meteors carried out in the years 1946—1953 by the members and collaborators of the Skalnaté Pleso Observatory. The majority of the results has been secured during systematic comet searches, for which the numbers of observed meteors and the net times of the observations have been recorded. In many cases previous to 1952 also some other data, such as the magnitudes, types etc. have been given by several observers; since 1952 the estimates of these quantities were regularly included. The other part of the data relates to special observations, the main task of which was directly collecting the data on telescopic meteors. Several double observations on the basis Skalnaté Pleso—Malá Svišťovka are also included; however they are treated only from the statistical point of view, and the results concerning the meteor heights will be published elsewhere after a further extension of the observations.

An important advantage of the present series of observations consists in the fact that they all have been performed with the same type of instrument (Somet-Binar binoculars of 10 cm aperture, 1/4.5 focal ratio, 25-fold magnification and 3.6° diameter of the field) and under very similar conditions. The use of these instruments proved to be very suitable for the purpose, particularly on account of the binocular arrangement and a handy stabil mounting, which enabled to secure uninterrupted observations, enduring even several hours, without any substantial fatigue of the observer. Many observations, especially those in Winter, have been made through open windows of the observatory. This arrangement proved to be advantageous, as the resulting thermal turbulence did not seriously interfere and the observer was right shielded from the disagreeable atmospheric influences (low temperature, wind) which are rather severe at the high location of the observatory (1783 m above sea-level). The observations excepting but very few cases have been carried out under perfect atmospheric conditions and during moonless nights only; in case if some cloudiness or haze appeared the telescope was directed so as to avoid it, and if it was impossible, the observation has been closed. The limiting magnitudes of the telescope was usually 12.5 to 13 for the stars and about 11 for the meteors near the centre of the field of view. Regularly, a section of the sky was sweeped from the horizon till near the zenith, so that the observations are uniformly enough distributed among different azimuths and altitudes.

The net times of individual observations were ranging from 15 minutes to several hours. For the statistical elaboration all observations enduring more than 150 minutes have been omitted, unless the observer has stated the numbers of meteors in shorter partial intervals. This was found necessary, since otherwise the daily motion of the apex could somewhat distort the results. As the correlation between hourly rates and altitude of the field of view could not be evaluated, the observations carried out in constant altitudes have been also omitted in the investigation of hourly rates. However, they have been retained for the second part of the work, concerning some particular features of telescopis meteors.

The distribution of observations according to the longitudes of the Sun ⊙ and Local Time T is shown in the form of a Time Table in Figure 1. Different years are represented by different markings (cf. the explanation at the top of the diagram), corresponding to the middle of time limits of the respective observations. The altitudes of the apex are indicated by the isopletes for each 5°. They have been taken from the diagram by Guth and Borecký [1], neglecting the small difference in geographical latitude which induces systematic errors of several tenths of a degree only.

The list of observers, who have participated on the programme, is given in Table I. The first column contains the full names of the observers, the second their abbreviations, the third the periods of observation, the fourth the number of observations, the fifth the total net time and the sixth the total number of observed meteors: all these quantities refer to the observations used for the statistical investigations of activity. The seventh column gives the number of meteors for which some particular data (used in the appendix to the present study) have been recorded.

3. *The Derivation of the Hourly Rates*

Table II contains a detailed list of observations on which the investigations of the telescopic meteors' activity are based. There are 1126 observations with a total net time of 1117 hours and 3925 recorded meteors. The first column of the Table gives the serial number of the observation arranged according to the Solar longitude), the second the solar longitude of the Sun $\odot$, the third the date of the beginning of the observation, the fourth the time limits of the observation's beginning and ending in M. E. T., the fifth the abbreviation of the observer *Obs.* (cf. Table I), the sixth the net time of the observation in minutes τ, the seventh the number of observed meteors n_o, the ninth the altitude of the apex for the middle time of observation H (read off from Figure 1) and the tenth the derived hourly rate $f_o = 60\, n_o/\tau$. The meaning of the remaining three columns will be explained in the following paragraphs.

Table I

Obs.	Abbr.	Period	o	τ	n	n'
R. Bajcár	Ba	1950	1	1.3	3	—
A. Bečvář	B	1946—1951	117	102.9	304	1
K. Bečvářová	Be	1947—1949	5	4.8	13	—
N. Blahová	Bl	1947—1949	3	4.3	11	—
Z. Bochníček	Bk	1946	—	—	—	22
J. Bouška	Bo	1946—1947	8	8.4	24	46
E. Buchar	Bu	1947	2	1.8	3	—
J. Bušek	Bš	1949	2	3.0	11	—
Z. Ceplecha	C	1948—1950	11	13.6	54	—
I. Čajda	Ča	1946—1949	1	1.7	0	33
M. Dzubák	D	1946—1947	20	12.6	83	253
M. Forgáč	F	1947—1948	16	16.3	42	—
M. Hartmannová	Ha	1946	1	0.5	1	—
J. Ivan	Iv	1949—1950	8	10.8	23	—
T. Jančik	J	1950—1951	37	44.2	130	—
L. Kresák	K	1946—1953	304	241.6	880	988
M. Kresáková	V	1952—1953	48	39.0	134	93
S. Krohová	Kr	1947	1	0.7	4	2
Z. Kvasnica	Kv	1948	3	2.7	1	—
V. Letfus	Le	1948	1	1.3	5	—
I. Ličko	L	1950—1951	12	16.5	41	—
K. Lichnerová	Ln	1950	2	3.6	11	—
B. Maleček	Ma	1946	1	1.5	4	—
A. Mrkos	M	1946—1950	246	286.5	1129	10
L. Mrkosová	P	1946—1953	250	273.5	964	268
A. Paroubek	Pa	1952—1953	8	4.2	10	4
L. Perek	Pe	1952	1	0.4	2	—
M. Plavec	Pl	1948	2	2.5	4	64
Z. Raušal	Ra	1948	1	2.0	4	—
E. Slováková	Sl	1949	1	2.1	2	—
R. Šáškyová	Ša	1952—1953	6	4.6	8	9
J. Štohl	Št	1952	3	1.5	5	—
F. Vadovič	Va	1947—1949	2	4.1	8	7
M. Vlasáková	Vl	1950	1	2.0	6	—
J. Zapatický	Za	1946	1	0.9	1	42
	Sum . . .	1946—1953	1126	1117.2	3925	1842

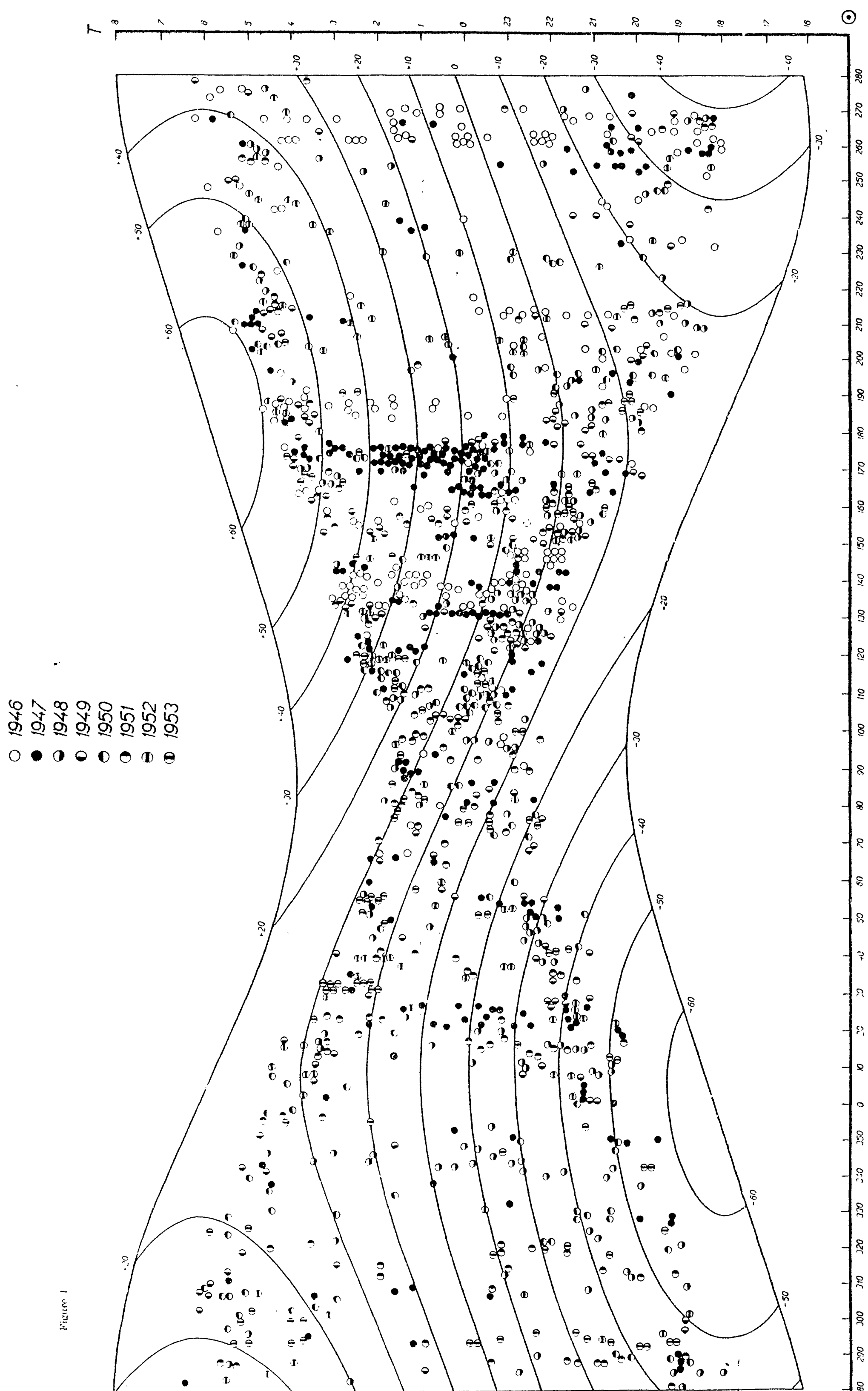

Figure 1

Table II

No	☉	Date	Time M. E. T.	Obs.	τ	n_o	n_c	H	f_o	f_c	F
1	0.4	1947 III. 21.	20 22—21 22	B	55	1	2	—45	1.1	2.1	0.5
2	0.4	1947 III. 21.	20 22—21 22	P	55	3	2	—45	3.3	2.1	1.6
3	0.4	1947 III. 21.	20 22—21 22	M	55	3	2	—45	3.3	2.1	1.6
4	0.6	1947 III. 22.	01 30—04 00	M	120	6	7	+ 6	3.0	3,4	0,9
5	1.1	1952 III. 21.	20 30—21 40	P	30	0	1	—42	0.0	2.2	0.0
6	1.4	1952 III. 22.	02 20—04 10	P	80	2	5	+10	1.5	3.5	0.4
7	3.8	1950 III. 25.	01 30—03 00	M	80	8	4	+ 3	6.0	3.3	1.8
8	4.9	1950 III. 26.	03 00—04 20	M	70	8	4	+12	6.9	3.5	2.0
9	6,1	1949 III. 27.	02 00—04 05	M	120	11	7	+ 8	5.5	3.4	1.6
10	6.8	1949 III. 27.	20 10—21 40	B	60	3	2	—45	3.0	2.1	1.4
11	6.9	1950 III. 28.	03 30—04 30	M	55	2	3	+13	2.2	3.6	0.6
12	7.1	1948 III. 27.	20 00—21 00	B	50	4	2	—48	4.8	2.1	2.3
13	7.1	1952 III. 27.	20 40—22 25	K	60	2	2	—39	2.0	2.2	0.9
14	7.1	1952 III. 27.	20 45—21 30	P	40	2	1	—42	3.0	2.2	1.4
15	7.3	1952 III. 28.	02 15—03 50	P	65	3	4	+ 8	2.8	3.4	0.8
16	7.3	1952 III. 28.	02 25—03 55	K	70	4	4	+ 9	3.4	3.4	1.0
17	7.8	1949 III. 28.	21 40—22 45	B	60	3	2	—32	3.0	2.4	1.2
18	8.0	1948 III. 28.	19 20—21 00	M	90	5	3	—50	3.3	2.1	1.6
19	8.1	1948 III. 28.	20 00—21 15	K	70	2	2	—47	1.7	2.1	0.8
20	9.1	1948 III. 29.	21 40—22 40	B	50	5	2	—32	6.0	2.4	2.5
21	9.6	1951 III. 31.	03 00—05 00	J	100	4	6	+13	2.4	3.6	0.7
22	9.8	1949 III. 30.	21 10—22 30	B	70	2	3	—36	1.7	2.3	0.7
23	10.0	1948 III. 30.	19 50—20 40	M	50	1	2	—50	1.2	2.1	0.6
24	10.0	1949 IV. 1.	02 00—04 00	M	100	8	5	— 8	4.8	3.0	1.6
25	10.1	1948 III. 30.	21 35—22 55	B	75	1	3	—32	0.8	2.4	0.3
26	10.2	1948 III. 30.	23 00—23 50	K	50	2	2	—20	2.4	2.7	0.9
27	11.7	1953 IV. 1.	19 30—20 50	V	70	5	2	—50	4.3	2.1	2.0
28	11.7	1953 IV. 1.	19 30—20 40	K	65	2	2	—51	1.8	2.0	0.9
29	12.3	1951 IV. 2.	21 00—22 50	B	65	3	3	—35	2.8	2.3	1.2
30	12.4	1947 IV. 3.	00 40—01 50	K	60	1	3	— 5	1.0	3.0	0.3
31	12.5	1951 IV. 3.	02 15—03 40	P	75	4	4	+ 8	3.2	3.4	0.9
32	13.0	1949 IV. 3.	01 30—03 45	M	130	8	7	+ 5	3.7	3.3	1.1
33	13.2	1951 IV. 3.	21 50—22 23	B	30	1	1	—33	2.0	2.4	0.8
34	13.5	1951 IV. 4.	02 12—03 25	P	65	2	4	+ 7	1.8	3.4	0.5
35	14.0	1948 IV. 3.	20 30—21 10	F	40	2	1	—45	3.0	2.1	1.4
36	14.0	1948 IV. 3.	20 30—21 30	B	55	1	2	—43	1.1	2.2	0.5
37	14.2	1948 IV. 4.	02 30—03 15	M	45	2	3	+ 8	2.7	3.4	0.8
38	14.2	1951 IV. 4.	20 35—21 55	P	70	2	3	—41	1.7	2.2	0.8
39	14.3	1951 IV. 4.	20 40—22 30	B	80	3	3	—38	2.2	2.3	1.0
40	14.3	1951 IV. 4.	22 30—23 50	J	70	3	3	—22	2.6	2.6	1.0
41	15.0	1948 IV. 4.	20 35—22 45	P	65	4	2	—37	3.7	2.3	1.6
42	15.0	1948 IV. 4.	20 40—22 00	B	70	1	3	—40	0,9	2.2	0.4
43	15.1	1948 IV. 4.	23 50—00 50	B	25	0	1	—12	0.0	2.9	0.0
44	15.2	1951 IV. 5.	20 20—21 00	B	38	2	1	—46	3.2	2.1	1.5
45	15.2	1952 IV. 5.	02 30—04 00	P	65	1	4	+10	0.9	3.5	0.3
46	15.2	1952 IV. 5.	03 20—04 05	K	40	0	2	+12	0.0	3.5	0.0
47	15.3	1948 IV. 5.	02 30—03 15	M	45	2	3	+ 8	2.7	3.4	0.8
48	15.3	1951 IV. 5.	22 30—23 30	J	60	2	3	—25	2.0	2.5	0.8
49	15.7	1953 IV. 5.	22 00—22 45	K	40	1	2	—30	1.5	2.4	0.6
50	16.0	1949 IV. 6.	03 30—04 00	M	30	2	2	+12	4.0	3.5	1.1
51	16.1	1951 IV. 6.	19 40—20 10	K	25	0	1	—52	0.0	2.0	0.0
52	16.3	1951 IV. 6.	23 00—00 00	J	50	0	2	—20	0.0	2.7	0.0
53	16.4	1951 IV. 7.	02 00—03 30	J	70	3	4	+ 7	2.6	3.4	0.8
54	17.2	1951 IV. 7.	21 50—23 30	K	85	6	3	—28	4.2	2.5	1.7
55	18.1	1947 IV. 8.	19 30—20 25	K	50	0	2	—52	0.0	2.0	0.0
56	18.2	1948 IV. 8.	02 05—03 30	M	80	12	5	+ 7	9.0	3.4	2.6
57	18.3	1951 IV. 9.	01 00—03 00	J	100	2	5	+ 2	1.2	3.2	0.4
58	18.6	1950 IV. 9.	00 10—02 10	M	110	5	6	— 5	2.7	3.0	0.9
59	19.0	1948 IV. 8.	22 00—00 35	M	150	5	7	—21	2.0	2.6	0.8
60	19.0	1948 IV. 8.	22 10—23 20	F	60	2	3	—26	2.0	2.5	0.8
61	19.1	1947 IV. 9.	19 35—20 25	K	45	1	2	—51	1.3	2.0	0.6
62	20.2	1947 IV. 10.	21 35—22 30	K	55	2	2	—33	2.2	2.4	0.9
63	20.2	1947 IV. 10.	22 10—22 43	P	33	0	1	—30	0.0	2.4	0.0
64	20.2	1947 IV. 10.	22 45—23 40	K	55	7	2	—22	7.6	2.6	2.9
65	20.3	1947 IV. 10.	23 40—00 20	M	40	1	2	—15	1.5	2.8	0.5
66	21.1	1947 IV. 11.	20 25—21 45	K	70	2	3	—42	1.7	2.2	0.8
67	21.3	1947 IV. 11.	23 30—01 05	K	90	4	4	—12	2.7	2.9	0.9
68	21.3	1947 IV. 12.	01 30—02 00	M	30	0	2	0	0.0	3.2	0.0
69	21.8	1952 IV. 11.	19 45—20 25	P	35	0	1	—50	0.0	2.1	0.0
70	22.1	1947 IV. 12.	20 30—21 30	K	60	4	2	—43	4.0	2.2	1.8
71	22.1	1947 IV. 12.	20 55—21 30	D	35	1	1	—41	1.7	2.2	0.8

No	⊙	Date	Time M. E. T.	Obs.	τ	n_o	n_c	H	f_o	f_c	F
72	22.1	1951 IV. 12.	20 55—22 10	K	70	2	3	—38	1.7	2.3	0.7
73	22.2	1947 IV. 12.	23 15—23 55	K	40	3	2	—18	4.5	2.7	1.7
74	22.2	1951 IV. 12.	22 05—23 25	B	70	2	3	—26	1.7	2.5	0.7
75	22.3	1951 IV. 13.	00 50—02 05	K	60	5	3	— 2	5.0	3.1	1.6
76	22.3	1951 IV. 13.	01 15—02 15	J	60	2	3	0	2.0	3.2	0.6
77	22.3	1951 IV. 13.	01 20—03 35	P	110	5	6	+ 5	2.7	3.3	0.8
78	22.8	1952 IV. 12.	20 05—21 45	K	95	2	3	—44	1.3	2.2	0.6
79	22.8	1952 IV. 12.	20 10—21 45	P	80	0	3	—44	0.0	2.2	0.0
80	22.8	1953 IV. 13.	02 30—03 30	P	40	2	2	+10	3.0	3.5	0.9
81	23.0	1948 IV. 13.	00 40—01 10	P	27	0	1	— 6	0.0	3.0	0.0
82	23.2	1947 IV. 13.	22 55—00 10	M	70	1	3	—23	0.9	2.6	0.3
83	23.3	1951 IV. 14.	02 00—03 30	P	50	0	3	+ 8	0.0	3.4	0.0
84	24.1	1947 IV. 14.	21 30—22 55	K	75	4	3	—32	3.2	2.4	1.3
85	24.8	1952 IV. 14.	20 20—21 45	P	65	2	2	—42	1.8	2.2	0.8
86	25.0	1947 IV. 15.	20 45—21 20	K	30	0	1	—42	0.0	2.2	0.0
87	25.1	1947 IV. 15.	22 30—23 25	K	55	3	2	—25	0.3	2.5	1.3
88	25.1	1947 IV. 15.	22 35—23 05	P	30	1	1	—25	2.0	2.5	0.8
89	25.2	1947 IV. 16.	00 05—01 30	K	80	5	4	— 6	3.8	3.0	1.3
90	25.9	1952 IV. 16.	00 15—01 25	P	55	5	5	— 7	2.2	3.0	0.7
91	26.0	1947 IV. 16.	20 25—21 00	D	28	0	1	—45	0.0	2.1	0.0
92	26.0	1947 IV. 16.	21 00—21 30	D	22	1	1	—40	2.7	2.2	1.2
93	26.1	1947 IV. 16.	23 00—23 30	D	27	1	1	—21	2.2	2.6	0.8
94	26.1	1947 IV. 16.	23 30—00 00	D	20	2	1	—17	6.0	2.7	2.2
95	26.2	1947 IV. 16.	23 40—01 30	K	100	3	5	— 9	1.8	2.9	0.6
96	26.5	1949 IV. 16.	20 20—22 10	B	95	5	4	—40	3.2	2.2	1.5
97	26.5	1949 IV. 16.	21 10—22 00	Be	50	1	2	—37	1.2	2.3	0.5
98	27.5	1949 IV. 17.	20 50—22 15	B	80	3	3	—38	2.2	2.3	1.0
99	27.5	1949 IV. 17.	21 00—22 15	Be	70	3	3	—37	2.6	2.3	1.1
100	28.0	1947 IV. 18.	20 45—21 45	K	50	1	2	—40	1.2	2.2	0.5
101	28.4	1949 IV. 18.	20 15—21 10	B	55	0	2	—45	0.0	2.1	0.0
102	28.9	1952 IV. 19.	02 20—03 10	K	40	0	2	+ 9	0.0	3.4	0.0
103	29.6	1949 IV. 20.	00 35—03 00	M	120	10	6	+ 1	5.0	3.2	1.6
104	30.2	1947 IV. 21.	01 10—03 15	K	40	1	2	+ 5	1.5	3.3	0.5
105	30.6	1953 IV. 21.	02 30—03 00	Pa	25	1	1	+ 9	2.4	3.4	0.7
106	33.3	1949 IV. 23.	21 10—22 00	B	50	1	2	—36	1.2	2.3	0.5
107	33.8	1951 IV. 24.	21 05—21 35	K	30	1	1	—41	2.0	2.2	0.9
108	34.6	1952 IV. 24.	23 20—00 30	V	35	3	2	—17	5.1	2.7	1.9
109	34.7	1952 IV. 25.	01 00—03 00	P	65	1	4	+ 5	0.9	3.3	0.3
110	34.8	1951 IV. 25.	21 00—22 30	L	70	1	3	—38	0.9	2.3	0.4
111	34.9	1951 IV. 25.	23 05—23 45	B	40	4	2	—18	6.0	2.7	2.2
112	35.0	1947 IV. 26.	01 20—03 00	M	80	2	4	+ 6	1.5	3.4	0.4
113	35.8	1951 IV. 26.	21 00—22 03	B	50	2	2	—36	2.4	2.3	1.0
114	35.9	1951 IV. 26.	23 00—00 00	J	50	1	2	—17	1.2	2.7	0.4
115	37.5	1952 IV. 27.	21 40—23 30	K	60	3	3	—26	3.0	2.5	1.2
116	37.5	1952 IV. 27.	21 45—23 30	V	50	2	2	—26	2.4	2.5	1.0
117	37.6	1952 IV. 28.	00 40—01 25	K	30	0	2	— 3	0.0	3.1	0.0
118	38.5	1948 IV. 28.	20 50—22 50	F	55	4	2	—34	4.4	2.3	1.9
119	38.5	1948 IV. 28.	21 00—22 00	B	55	4	2	—36	4.4	2.3	1.9
120	39.2	1949 IV. 29.	21 25—22 25	B	50	4	2	—32	4.8	2.4	2.0
121	39.6	1952 IV. 30.	00 20—02 30	P	100	6	5	0	3.6	3.2	1.1
122	39.6	1952 IV. 30.	00 45—01 50	K	50	1	3	— 1	1.2	3.2	0.4
123	39.6	1952 IV. 30.	01 20—02 30	Ša	30	1	2	+ 5	2.0	3.3	0.6
124	39.6	1952 IV. 30.	01 20—02 30	V	30	2	2	+ 5	4.0	3.3	1.2
125	39.8	1951 IV. 30.	23 30—00 10	B	33	2	2	—14	3.6	2.8	1.3
126	39.8	1951 V. 1.	01 00—02 00	J	50	1	2	+ 1	1.2	3.2	0.4
127	40.4	1949 V. 1.	02 00—03 00	M	60	4	3	+10	4.0	3.5	1.1
128	40.8	1951 V. 1.	23 30—02 00	L	120	3	6	— 5	1.5	3.0	0.5
129	40.8	1951 V. 2.	00 30—02 30	J	100	2	5	+ 1	1.2	3.2	0.4
130	41.1	1949 V. 1.	20 30—23 00	M	100	6	4	—43	3.6	2.2	1.6
131	41.1	1953 V. 1.	21 00—22 02	K	60	1	2	—35	1.0	2.3	0.4
132	41.1	1953 V. 1.	21 04—22 14	V	65	1	3	—34	0.9	2.3	0.4
133	42.0	1953 V. 2.	20 35—21 45	K	65	3	2	—38	2.8	2.3	1.2
134	42.1	1949 V. 2.	21 15—22 15	B	55	3	2	—33	3.3	2.4	1.4
135	42.8	1950 V. 3.	20 30—21 30	M	50	2	2	—40	2.4	2.2	1.1
136	43.3	1948 V. 3.	21 15—22 30	B	70	1	3	—31	0.9	2.4	0.4
137	44.2	1949 V. 5.	00 40—01 20	M	40	6	2	— 2	9.0	3.1	2.9
138	44.3	1948 V. 4.	21 15—23 10	P	50	5	2	—28	6.0	2.5	2.4
139	44.4	1948 V. 5.	01 10—02 10	P	55	6	3	+ 4	6.5	3.3	2.0
140	46.2	1948 V. 6.	21 15—22 45	P	80	2	3	—30	1.5	2.4	0.6
141	46.2	1948 V. 6.	21 30—22 30	B	45	2	2	—30	2.7	2.4	1.1
142	46.9	1950 V. 8.	00 30—02 30	M	120	5	7	+ 3	2.5	3.3	0.8

No	⊙	Date	Time M. E. T.	Obs.	τ	n_o	n_c	H	f_o	f_c	F
143	47.2	1948 V. 7.	21 35—22 35	B	40	1	2	—28	1.5	2.5	0.6
144	47.3	1948 V. 7.	23 45—01 00	P	30	3	1	— 7	6.0	3.0	2.0
145	48.0	1953 V. 9.	01 00—01 45	Pa	40	2	2	+ 2	3.0	3.2	0.9
146	48.6	1947 V. 10.	00 20—02 20	M	100	3	5	+ 2	1.8	3.2	0.6
147	48.6	1950 V. 9.	21 25—22 00	K	30	1	1	—32	2.0	2.4	0.8
148	49.1	1948 V. 9.	21 20—22 10	B	40	1	2	—31	1.5	2.4	0.6
149	49.4	1947 V. 10.	20 55—21 55	P	30	1	1	—35	2.0	2.3	0.9
150	50.1	1948 V. 10.	21 10—22 55	B	90	2	4	—28	1.3	2.5	0.5
151	50.3	1947 V. 11.	21 35—22 25	P	50	1	2	—28	1.2	2.5	0.5
152	50.3	1947 V. 11.	21 35—22 30	M	55	2	2	—28	2.2	2.5	0.9
153	50.3	1948 V. 11.	01 10—02 23	P	50	2	3	+ 6	2.4	3.4	0.7
154	50.5	1950 V. 11.	20 00—21 40	M	90	3	3	—39	2.0	2.2	0.9
155	50.8	1953 V. 11.	22 35—23 30	K	50	1	2	—18	1.2	2.7	0.4
156	50.8	1953 V. 11.	22 57—23 35	V	25	2	1	—16	4.8	2.8	1.7
157	51.0	1953 V. 12.	01 35—02 15	K	40	0	2	+ 7	0.0	3.4	0.0
158	52.0	1952 V. 12.	21 40—23 20	K	60	3	3	—23	3.0	2.6	1.2
159	52.0	1952 V. 12.	21 50—23 30	V	50	0	2	—22	0.0	2.6	0.0
160	52.3	1947 V. 13.	20 55—22 00	M	60	3	2	—34	3.0	2.3	1.3
161	52.4	1947 V. 14.	00 50—02 40	M	90	3	5	+ 6	2.0	3.4	0.6
162	53.1	1952 V. 13.	23 55—00 35	K	30	0	2	— 6	0.0	3.0	0.0
163	53.3	1947 V. 14.	21 55—23 35	M	85	3	4	—20	2.1	2.7	0.8
164	54.2	1947 V. 15.	21 25—22 45	M	70	0	3	—26	0.0	2.5	0.0
165	54.2	1947 V. 15.	21 25—22 45	P	70	2	3	—26	1.7	2.5	0.7
166	54.7	1949 V. 15.	21 00—23 20	M	130	12	6	—25	5.5	2.5	2.2
167	54.7	1949 V. 15.	21 15—22 17	Be	55	2	2	—30	2.2	2.4	0.9
168	54.8	1953 V. 16.	01 17—01 55	V	30	0	2	+ 6	0.0	3.4	0.0
169	54.8	1953 V. 16.	01 30—02 15	Ša	35	0	2	+ 8	0.0	3.4	0.0
170	54.8	1953 V. 16.	01 30—02 15	Pa	40	0	2	+ 8	0.0	3.4	0.0
171	55.1	1948 V. 16.	01 30—02 15	P	30	1	2	+ 9	2.0	3.4	0.6
172	55.2	1947 V. 16.	22 00—00 15	M	110	3	5	—16	1.6	2.8	0.6
173	55.4	1950 V. 16.	23 30—00 30	M	60	4	3	—18	4.0	2.7	1.5
174	55.7	1949 V. 16.	23 00—00 40	M	85	2	4	—10	1.4	2.9	0.5
175	55,8	1953 V. 17.	01 00—02 25	V	70	4	4	+ 7	3.4	3.4	1.0
176	55.8	1953 V. 17.	01 00—01 50	K	50	4	3	+ 5	4.8	3.3	1.5
177	57.6	1949 V. 18.	23 10—01 00	M	70	2	3	— 7	1.7	3.0	0.6
178	57.7	1953 V. 19.	00 25—00 55	Pa	25	1	1	— 1	2.4	3.2	0.8
179	59.2	1947 V. 21.	01 00—02 30	M	80	4	5	+ 9	3.0	3.4	0.9
180	59.3	1950 V. 20.	22 00—22 55	K	45	1	2	—22	1.3	2.6	0.5
181	59.8	1952 V. 20.	23 45—00 25	K	40	1	2	— 6	1.5	3.0	0.5
182	63.9	1951 V. 25.	23 30—00 30	J	40	2	2	— 5	3.0	3.0	1.0
183	64.9	1947 V. 26.	23 50—00 40	M	50	1	3	— 3	1.2	3.1	0.4
184	65.4	1949 V. 27.	01 00—02 00	M	60	2	3	+ 9	2.0	3.4	0.6
185	65.9	1947 V. 28.	00 35—01 40	M	60	1	3	+ 6	1.0	3.4	0.3
186	65.9	1947 V. 28.	01 30—02 00	P	30	2	2	+10	4.0	3.5	1.1
187	66.1	1946 V. 28	01 00—02 00	M	55	6	3	+ 9	6.5	3.4	1.9
188	66.3	1949 V. 27.	23 00—01 30	M	120	6	6	— 2	3.0	3.1	1.0
189	67.1	1946 V. 29.	00 00—01 44	P	44	4	2	+ 4	5.5	3.3	1.7
190	68.1	1949 V. 29.	21 30—22 38	B	68	3	3	—22	2.6	2.6	1.0
191	69.1	1949 V. 30.	21 20—22 38	B	70	3	3	—23	2.6	2.6	1.0
192	69.6	1951 V. 31.	23 30—00 10	B	35	1	2	— 4	1.7	3.1	0.5
193	70.7	1951 VI. 2.	00 30—02 30	J	100	3	6	+10	1.8	3.5	0.5
194	71.7	1950 VI. 2.	21 30—22 45	M	70	0	3	—21	0.0	2.6	0.0
195	72.7	1950 VI. 3.	21 40—00 10	M	120	8	6	—13	4.0	2.8	1.4
196	73.0	1949 VI. 3.	23 30—01 50	M	120	5	7	+ 4	2.5	3.3	0.8
197	73.4	1951 VI. 4.	22 15—22 55	B	40	2	2	—16	3.0	2.8	1.1
198	74.5	1951 VI. 6.	00 10—01 25	P	65	2	4	+ 5	1.8	3.3	0.5
199	74.6	1950 VI. 5.	22 00—23 00	B	45	3	2	—17	4.0	2.7	1.5
200	74.7	1946 VI. 5.	00 00—01 30	P	80	2	4	+ 5	1.5	3.3	0.5
201	74.9	1953 VI. 5.	22 35—23 25	P	25	1	1	—12	2.4	2.9	0.8
202	75.8	1953 VI. 6.	21 45—22 05	Pa	15	0	1	—22	0.0	2.6	0.0
203	75.9	1953 VI. 6.	22 10—23 50	P	90	4	4	—11	2.7	2.9	0.9
204	75.9	1953 VI. 6.	22 35—00 55	K	120	3	6	— 4	1.5	3.1	0.5
205	75.9	1953 VI. 6.	22 50—00 10	V	60	0	3	— 6	0.0	3.0	0.0
206	76.8	1949 VI. 8.	21 30—22 10	B	35	0	2	—22	0.0	2.6	0.0
207	76.8	1953 VI. 7.	21 40—22 30	K	30	1	1	—20	2.0	2.7	0.7
208	77.3	1947 VI. 8.	23 30—00 30	P	60	1	3	— 1	1.0	3.2	0.3
209	77.3	1951 VI. 8.	22 45—23 15	K	30	0	1	—10	0.0	2.9	0.0
210	77.5	1950 VI. 8.	21 30—22 10	B	35	0	2	—21	0.0	2.6	0.0
211	77.9	1953 VI. 9.	00 55—01 25	K	30	1	2	+10	2.0	3.5	0.6
212	77.9	1953 VI. 9.	00 55—01 25	V	30	4	2	+10	8.0	3.5	2.3
213	78.0	1948 VI. 8.	21 30—23 45	B	80	1	4	—15	0.8	2.8	0.3

No	⊙	Date	Time M. E. T.	Obs.	τ	n_o	n_c	H	f_o	f_c	F
214	79.7	1953 VI. 10.	23 15—00 00	V	40	3	2	— 4	4.5	3.1	1.5
215	80.1	1951 VI. 11.	23 05—23 35	B	30	1	2	— 6	2.0	3.0	0.7
216	80.2	1947 VI. 11.	23 15—01 00	P	40	0	2	+ 1	0.0	3.2	0.0
217	80.9	1948 VI. 12.	00 06—01 10	P	58	1	3	+ 6	1.0	3.4	0.3
218	81.1	1947 VI. 12.	22 15—23 35	B	60	1	3	—10	1.0	2.9	0.3
219	81.1	1947 VI. 12.	22 30—00 30	P	150	4	8	— 4	1.6	3.1	0.5
220	81.2	1951 VI. 13.	00 45—01 20	K	30	0	2	+10	0.0	3.5	0.0
221	81.2	1951 VI. 13.	00 50—01 30	P	30	2	2	+11	4.0	3.5	1.1
222	81.9	1948 VI. 13.	01 10—01 35	P	25	1	1	+13	2.4	3.6	0.7
223	82.0	1947 VI. 13.	22 00—22 40	B	40	0	2	—19	0.0	2.7	0.0
224	82.6	1953 VI. 13.	00 15—00 45	Pa	30	0	2	+ 6	0.0	3.4	0.0
225	82.6	1953 VI. 13.	00 40—01 20	K	40	0	2	+10	0.0	3.5	0.0
226	82.8	1952 VI. 13.	21 50—23 05	K	70	3	3	—14	2.6	2.8	0.9
227	83.1	1951 VI. 15.	01 13—00 05	P	60	6	3	+ 7	6.0	3.4	1.8
228	83.5	1949 VI. 14.	21 35—23 20	M	100	2	5	—14	1.2	2.8	0.4
229	84.1	1951 VI. 16.	01 30—02 00	K	30	1	2	+ 9	2.0	3.4	0.6
230	84.4	1949 VI. 15.	22 30—00 05	M	90	2	5	— 6	1.3	3.0	0.4
231	85.4	1949 VI. 16.	22 00—00 00	M	120	4	6	— 8	2.0	3.0	0.7
232	86.1	1950 VI. 17.	22 40—01 00	M	150	9	8	0	3.6	3.2	1.1
233	86.1	1950 VI. 17.	23 20—00 10	B	40	2	2	0	3.0	3.2	0.9
234	86.5	1953 VI. 17.	00 30—01 40	P	65	4	4	+12	3.7	3.5	1.1
235	86.6	1952 VI. 17.	23 45—01 15	K	90	6	5	+ 7	4.0	3.4	1.2
236	86.8	1947 VI. 18.	22 40—23 10	B	30	2	1	— 7	4.0	3.0	1.3
237	86.8	1947 VI. 18.	22 55—23 55	P	55	2	3	— 4	2.2	3.1	0.7
238	88.8	1947 VI. 21.	00 15—01 35	P	70	0	4	+12	0.0	3.5	0.0
239	89.8	1947 VI, 22.	00 05—01 23	M	73	0	4	+10	0.0	3.5	0.0
240	89.8	1947 VI. 22.	00 25—01 23	P	52	0	3	+11	0.0	3.5	0.0
241	90.6	1951 VI. 22.	21 15—22 55	P	95	6	4	—15	3.8	2.8	1.4
242	90.6	1951 VI. 22.	22 00—22 50	B	50	3	2	—11	3.6	2.9	1.2
243	90.7	1947 VI. 23.	00 00—01 54	M	94	3	6	+12	1.9	3.5	0.5
244	91.5	1948 VI. 23.	00 50—01 25	P	35	3	2	+14	5.1	3.6	1.4
245	91.6	1947 VI. 23.	21 50—22 30	B	40	2	2	—14	3.0	2.8	1.1
246	92.2	1953 VI. 23.	00 35—01 35	P	55	3	3	+13	3.3	3.6	0.9
247	92.6	1947 VI. 25	00 35—01 23	P	43	2	3	+13	2.8	3.6	0.8
248	92.7	1947 VI. 25.	00 40—01 28	M	43	1	3	+14	1.4	3.6	0.4
249	93.5	1951 VI. 25.	22 20—00 10	P	80	3	4	— 2	2.2	3.1	0.7
250	93.5	1951 VI. 25.	23 25—00 25	K	50	6	3	+ 4	7.2	2.3	2.2
251	94.5	1947 VI. 26.	23 00—01 30	M	50	7	3	+ 7	8.4	3.4	2.5
252	94.8	1946 VI. 26.	23 56—01 06	P	60	4	3	+10	4.0	3.5	1.1
253	95.4	1951 VI. 27.	22 10—22 45	K	30	0	1	— 9	0.0	2.9	0.0
254	96.1	1948 VI. 27.	22 00—23 00	B	54	1	3	— 8	1.1	3.0	0.4
255	96.1	1948 VI. 27.	22 00—23 00	P	55	1	3	— 8	1.1	3.0	0.4
256	96.4	1951 VI. 28.	23 40—00 25	K	40	1	2	+ 6	1.5	3.4	0.4
257	97.1	1952 VI. 29.	00 40—01 15	K	30	1	2	+16	2.0	3.7	0.6
258	97.6	1946 VI. 29.	22 05—23 30	B	80	2	4	— 6	1.5	3.0	0.5
259	98.0	1948 VI. 29.	22 05—00 00	Pl	103	0	5	— 3	0.0	3.1	0.0
260	98.1	1948 VI. 29.	22 40—00 08	B	78	4	4	0	3.1	3.2	1.0
261	98.1	1948 VI. 29.	22 45—00 05	P	60	6	3	0	6.0	3.2	1.9
262	98.2	1951 VI. 30.	21 35—22 10	K	30	0	1	—14	0.0	2.8	0.0
263	98.3	1951 VI. 30.	23 50—01 40	P	95	5	6	+13	3.2	3.6	0.9
264	98.3	1951 VII. 1.	00 35—01 25	K	45	2	3	+15	2.7	3.6	0.8
265	98.5	1946 VI. 30.	22 00—23 30	B	80	4	4	— 5	3.0	3.0	1.0
266	99.3	1951 VII. 1.	23 40—01 35	P	90	7	5	+12	4.7	3.5	1.3
267	99.3	1951 VII. 1.	23 50—01 35	K	90	4	5	+13	2.7	3.6	0.8
268	100.7	1953 VII. 2.	21 55—22 35	K	35	0	2	— 9	0.0	2.9	0.0
269	100.7	1253 VII. 2.	22 00—22 35	V	35	2	2	— 9	3.4	2.9	1.2
270	100.9	1952 VII. 2.	22 40—01 00	V	60	7	3	+ 6	7.0	3.4	2.1
271	102.1	1951 VII. 4.	23 30—00 00	K	25	2	1	+ 5	4.8	3.3	1.5
272	103.0	1951 VII. 5.	22 15—23 25	P	65	3	3	— 3	2.8	3.1	0.9
273	103.1	1951 VII. 5.	23 30—01 10	K	90	4	5	+11	2.7	3.5	0.8
274	103.5	1949 VII. 5.	22 40—00 45	Sl	125	2	7	+ 5	1.0	3.3	0.3
275	103.5	1949 VII. 5.	22 40—00 45	Bš	125	3	7	+ 5	1.4	3.3	0.4
276	103.5	1949 VII. 5.	22 40—00 45	Va	125	4	7	+ 5	1.9	3.3	0.6
277	103.7	1948 VII. 5.	22 50—23 30	Kv	40	0	2	— 9	0.0	2.9	0.0
278	104.5	1949 VII. 6.	23 00—01 10	Bš	130	8	7	+ 9	3.7	3.4	1.1
279	104.5	1949 VII. 6.	23 00—01 10	Va	120	4	7	+ 9	2.0	3.4	0.6
280	105.0	1951 VII. 7.	23 50—01 35	K	95	5	6	+15	3.2	3.6	0.9
281	105.2	1950 VII. 7.	23 00—00 00	P	60	3	3	+ 5	3.0	3.3	0.9
282	105.4	1953 VII. 7.	22 20—23 20	K	55	4	3	— 2	4.4	3.1	1.4
283	106.5	1953 VII. 8.	23 45—01 20	K	90	8	5	+14	5.3	3.6	1.5
284	107.1	1950 VII. 9.	22 00—00 10	M	120	7	6	+ 1	3.5	3.2	1.1

No	⊙	Date	Time M. E. T.	Obs.	τ	n_o	n_c	H	f_o	f_c	F
285	107.1	1950 VII. 9.	22 30—00 30	P	120	7	7	+ 5	3.5	3.3	1.1
286	107.1	1950 VII. 9.	22 30—00 30	J	120	6	7	+ 5	3.0	3.3	0.9
287	107.1	1950 VII. 9.	22 30—00 30	Vl	120	6	7	+ 5	3.0	3.3	0.9
288	107.6	1948 VII. 9.	23 10—01 30	M	110	4	7	+13	2.2	3.6	0.6
289	107.6	1951 VII. 10.	22 05—23 05	B	60	4	3	— 3	4.0	3.1	1.3
290	107.7	1948 VII. 10.	00 47—01 45	Kv	53	0	3	+22	0.0	3.8	0.0
291	108.0	1950 VII. 10.	22 10—22 40	B	35	5	2	— 1	8.6	3.2	2.7
292	108.1	1950 VII. 10.	23 20—01 15	M	100	7	6	+12	4.2	3.5	1.2
293	108.8	1951 VII. 11.	22 20—23 35	B	70	1	4	0	0.9	3.2	0.3
294	108.8	1951 VII. 12.	00 50—01 45	K	50	4	3	+22	4.8	3.8	1.3
295	109.0	1950 VII. 11.	23 00—00 00	M	40	2	2	+ 5	3.0	3.3	0.9
296	109.6	1948 VII. 12.	00 20—01 50	M	60	4	4	+21	4.0	3.8	1.1
297	109.6	1948 VII. 12.	00 20—01 50	P	80	5	5	+21	3.8	3.8	1.0
298	110.0	1950 VII. 12.	23 00—23 45	M	40	3	2	+ 5	4.5	3.3	1.4
299	110.4	1948 VII. 12.	22 20—23 40	Kv	70	1	4	+ 1	0.9	3.2	0.3
300	110.4	1948 VII. 12.	22 20—23 50	Le	80	5	4	+ 3	3.8	3.3	1.2
301	110.4	1948 VII. 12.	22 55—23 37	M	35	6	2	+ 4	10.3	3.3	3.1
302	110.5	1948 VII. 12.	23 50—01 35	P	100	12	6	+18	7.2	3.7	1.9
303	110.7	1947 VII. 13.	22 00—23 20	Bl	70	7	4	— 1	6.0	3.2	1.9
304	110.7	1951 VII. 14.	00 25—01 35	K	65	5	4	+20	4.6	3.8	1.2
305	111.0	1950 VII. 14.	01 00—02 00	M	60	3	4	+25	3.0	3.9	0.8
306	111.6	1947 VII. 14.	22 05—22 55	B	45	1	2	— 3	1.3	3.1	0.4
307	111.7	1947 VII. 15.	01 10—01 45	M	35	2	2	+25	3.4	3.9	0.9
308	111.7	1951 VII. 15.	00 05—01 00	P	50	4	3	+17	4.8	3.7	1.3
309	111.7	1951 VII. 15.	00 10—00 50	K	40	1	2	+16	1.5	3.7	0.4
310	111.9	1946 VII. 14.	22 00—00 27	K	110	6	6	+ 4	3.3	3.3	1.0
311	111.9	1946 VII. 14.	22 00—23 35	Ma	90	4	5	— 1	2.7	3.2	0.8
312	111.9	1950 VII. 14.	22 45—00 30	J	60	8	3	+ 8	8.0	3.4	2.4
313	111.9	1950 VII. 15.	00 00—02 00	P	100	7	6	+21	4.2	3.8	1.1
314	112.2	1953 VII. 14.	23 10—00 10	K	60	6	3	+ 8	6.0	3.4	1.8
315	112.2	1953 VII, 14.	00 00—01 40	P	90	4	6	+21	2.7	3.8	0.7
316	112.8	1946 VII. 15.	22 30—23 35	K	60	3	3	+ 3	3.0	3.3	0.9
317	113.1	1953 VII. 15.	22 40—23 40	V	50	2	3	+ 4	2.4	3.3	0.7
318	113.1	1953 VII. 15.	22 55—23 35	K	35	3	2	+ 4	5.1	3.3	1.5
319	113.3	1952 VII. 15.	22 20—23 40	K	65	3	4	+ 3	2.8	3.3	0.8
320	114.1	1953 VII. 17.	00 30—01 50	P	75	5	5	+23	4.0	3.9	1.0
321	114.7	1946 VII. 17.	22 50—23 30	K	35	6	2	+ 5	10.3	3.3	3.1
322	114.8	1950 VII. 18.	01 00—02 00	M	60	4	4	+27	4.0	4.0	1.0
323	115.0	1953 VII. 17.	22 25—00 00	K	80	7	4	+ 5	5.2	3.3	1.6
324	115.0	1953 VII. 17.	22 25—00 00	V	80	8	4	+ 5	6.0	3.3	1.8
325	115.5	1947 VII. 18.	23 15—00 00	K	45	1	3	+ 9	1.3	3.4	0.4
326	115.8	1950 VII. 19.	00 30—02 00	J	40	6	3	+25	9.0	3.9	2.3
327	115.8	1950 VII. 19.	00 30—02 00	P	90	5	6	+25	3.3	3.9	0.8
328	115.8	1950 VII. 19.	00 30—02 30	M	60	4	4	+27	4.0	4.0	1.0
329	116.4	1947 VII. 19.	21 35—22 30	K	50	1	3	— 5	1.2	3.0	0.4
330	116.5	1947 VII. 20.	01 20—02 00	K	40	0	3	+29	0.0	4.0	0.0
331	117.6	1950 VII. 20.	22 00—00 30	P	135	11	8	+ 6	4.9	3.4	1.4
332	117.6	1950 VII. 20.	22 40—00 00	B	60	3	3	+ 7	3.0	3.4	0.9
333	117.7	1950 VII, 21.	01 30—02 00	M	30	1	2	+30	2.0	4.1	0.5
334	118.1	1952 VII. 20.	23 05—00.00	K	50	1	3	+ 9	1.2	3.4	0.4
335	118.1	1952 VII. 21.	01 30—02 00	K	30	2	2	+30	4.0	4.1	1.0
336	118.3	1947 VII. 21.	21 20—22 20	M	55	2	3	— 7	2.2	3.0	0.7
337	118.5	1950 VII. 21.	22 30—00 00	Ba	80	3	4	+ 6	2.2	3.4	0.6
338	118.5	1950 VII. 21.	22 40—23 25	B	40	3	2	+ 5	4.5	3.3	1.4
339	118.6	1950 VII. 22.	00 15—01 10	P	50	4	3	+20	4.8	3.8	1.3
340	118.9	1953 VII. 21.	01 35—02 08	P	33	2	2	+31	3.6	4.1	0.9
341	119.0	1952 VII. 21.	23 15—00 56	V	40	7	2	+15	10.5	3.6	2.9
342	119.1	1952 VII. 22.	00 55—02 00	K	60	6	4	+28	6.0	4.0	1.5
343	119.1	1952 VII. 22.	01 05—01 40	Pe	25	2	2	+27	4.8	4.0	1.2
344	119.2	1947 VII. 22.	22 00—23 00	K	50	1	3	0	1.2	3.2	0.4
345	119.4	1947 VII. 23.	02 00—02 30	M	30	1	2	+34	2.0	4.2	0.5
346	119.9	1953 VII. 23.	00 30—01 45	K	50	4	3	+25	4.8	3.9	1.2
347	119.9	1953 VII. 23.	00 30—01 45	V	55	5	4	+25	5.5	3.9	1.4
348	119.9	1953 VII. 23.	01 40—02 10	P	30	2	2	+31	4.0	4.1	1.0
349	120.0	1952 VII. 23.	00 30—02 00	K	55	5	4	+26	5.5	3.9	1.4
350	120.1	1952 VII. 23.	01 30—02 00	V	20	3	1	+30	9.0	4.1	2.2
351	120.2	1947 VII. 23.	22 00—23 00	Bu	55	2	3	0	2.2	3.2	0.7
352	120.8	1953 VII. 24.	01 45—02 15	P	30	3	2	+33	6.0	4.1	1.5
353	121.2	1947 VII. 25.	00 50—01 20	M	30	1	2	+25	2.0	3.9	0.5
354	121.3	1947 VII. 25.	00 00—01 33	K	80	4	5	+22	3.0	3.8	0.8
355	121.6	1949 VII. 24.	22 10—23 40	M	90	11	5	+ 4	7.3	3.3	2.2

No	⊙	Date	Time M. E. T.	Obs.	τ	n_o	n_c	H	f_o	f_c	F
356	122.2	1947 VII. 26.	00 10—00 50	M	40	2	3	+20	3.0	3.8	0.8
357	122.2	1947 VII. 26.	00 33—01 10	K	37	1	2	+23	1.6	3.9	0.4
358	122.3	1947 VII. 26.	01 20—02 20	Bu	55	1	4	+32	1.1	4.1	0.3
359	122.5	1950 VII. 26.	01 30—02 10	M	40	3	3	+32	4.5	4.1	1.1
360	122.6	1949 VII. 25.	21 50—22 35	B	35	2	2	— 2	3.4	3.1	1.1
361	122.8	1952 VII. 25.	22 13—22 46	Št	25	3	1	+ 1	7.2	3.2	2.2
362	123.2	1947 VII. 27.	01 30—02 10	P	40	1	3	+32	1.5	4.1	0.4
363	123.5	1949 VII. 26.	22 00—22 45	M	45	3	2	0	4.0	3.2	1.2
364	123.5	1949 VII. 26.	22 10—22 50	B	35	2	2	+ 1	3.4	3.2	1.1
365	123.9	1952 VII. 27.	01 05—01 50	Št	30	1	2	+28	2.0	4.0	0.5
366	123.9	1952 VII. 27.	01 35—02 05	K	30	1	2	+32	2.0	4.1	0.5
367	124.2	1946 VII. 27.	20 45—23 25	Bo	150	4	8	— 3	1.6	3.1	0.5
368	124.5	1949 VII. 27.	22 00—00 30	M	105	7	6	+ 8	4.0	3.4	1.2
369	124.7	1948 VII. 27.	21 15—23 15	Ra	118	4	6	— 1	2.2	3.2	0.7
370	124.7	1948 VI. 27.	22 25—23 15	P	45	3	2	+ 5	4.0	3.3	1.2
371	125.0	1947 VII. 28.	21 30—22 20	Kr	40	4	2	— 4	6.0	3.1	1.9
372	125.0	1951 VII. 28.	22 10—23 15	P	60	2	3	+ 3	2.0	3.3	0.6
373	125.0	1951 VII. 28.	22 16—23 08	B	45	1	2	+ 3	1.3	3.3	0.4
374	125.1	1947 VII. 29.	01 40—02 20	M	40	0	3	+34	0.0	4.2	0.0
375	125,4	1949 VII. 28.	21 15—22 10	M	50	2	3	— 5	2.4	3.0	0.8
376	125.7	1948 VII. 28.	21 20—22 20	M	50	2	3	— 5	2.4	3.0	0.8
377	125.7	1948 VII. 28.	21 20—22 25	F	60	2	3	— 4	2.0	3.1	0.6
378	125.7	1948 VII. 28.	22 20—23 30	P	50	3	3	+ 5	3.6	3.3	1.1
379	125.7	1952 VII. 28.	21 45—22 50	Št	35	1	2	0	1.7	3.2	0.5
380	125.9	1951 VII. 29.	21 30—23 00	P	80	1	4	0	0.8	3.2	0.2
381	126.6	1948 VII. 29.	21 30—22 35	M	120	13	6	— 4	6.5	3.1	2.1
382	126.9	1946 VII. 30.	21 30—22 50	Bo	70	6	4	0	5.1	3.2	1.6
383	127.4	1949 VII. 30.	23 00—02 00	M	150	11	9	+21	4.4	3.8	1.2
384	127.6	1948 VII. 30.	21 44—00 05	P	120	11	7	+ 6	5.5	3.4	1.6
385	127.6	1948 VII. 30.	21 50—22 25	Pl	35	4	2	— 1	6.9	3.2	2.2
386	127.8	1951 VII. 31.	21 50—23 50	P	100	5	6	+ 5	3.0	3.3	0.9
387	127.8	1951 VII. 31.	22 05—23 45	K	80	4	5	+ 7	3.0	3.4	0.9
388	128.9	1951 VIII. 2.	01 20—02 20	P	55	2	4	+34	2.2	4.2	0.5
389	129.3	1949 VIII. 1.	22 40—23 20	B	35	3	2	+ 7	5.1	3.4	1.5
390	129.5	1948 VIII. 1.	22 05—22 35	B	30	3	2	+ 1	6.0	3.2	1.9
391	129.7	1947 VIII. 2.	21 00—21 43	Bo	43	2	2	— 7	2.8	3.0	0.9
392	129.8	1951 VIII. 2.	22 10—22 47	B	35	0	2	+ 2	0.0	3.2	0.0
393	130.2	1949 VIII. 2.	21 00—21 50	K	50	2	3	— 6	2.4	3.0	0.8
394	130.2	1949 VIII. 2.	21 55—22 45	B	50	2	3	+ 2	2.4	3.2	0.8
395	130.4	1949 VIII. 3.	00 40—02 30	M	110	11	8	+32	6.0	4.1	1.5
396	130.5	1948 VIII. 2.	23 30—01 15	P	80	13	5	+21	9.8	3.8	2.6
397	130.6	1948 VIII. 3.	01 20—02 20	M	60	8	4	+35	8.0	4.2	1.9
398	130.6	1952 VIII. 3.	01 25—02 05	K	30	1	2	+34	2.0	4.2	0.5
399	130.6	1952 VIII, 3.	01 25—02 05	V	30	2	2	+34	4.0	4.2	1.0
400	130.6	1952 VIII. 3.	01 45—02 45	P	55	2	4	+38	2.2	4.3	0.5
401	131.2	1949 VIII. 3.	23 40—00 15	K	30	2	2	+17	4.0	3.7	1.1
402	131.3	1949 VIII. 4.	01 00—02 30	M	90	14	6	+34	9.3	4.2	2.2
403	131.4	1948 VIII. 3.	21 20—22 00	M	40	4	2	— 4	6.0	3.1	1.9
404	131.4	1948 VIII. 3.	22 05—22 50	P	45	8	2	+ 3	10.7	3.3	3.2
405	131.9	1946 VIII. 4.	22 20—23 05	K	35	2	2	+ 5	3.4	3.3	1.0
406	132.6	1946 VIII. 5.	20 45—21 30	Bo	45	4	2	— 8	5.3	3.0	1.8
407	133.6	1951 VIII. 6.	22 40—23 40	P	55	2	3	+10	2.2	3.5	0.6
408	133.7	1951 VIII. 7.	00 05—01 25	B	65	0	4	+25	0.0	3.9	0.0
409	133.7	1951 VIII. 7.	02 10—02 50	P	30	1	2	+41	2.0	4.3	0.5
410	134.2	1949 VIII. 7.	01 40—02 55	K	70	6	5	+40	5.1	4.3	1.2
411	134.2	1949 VIII. 7.	01 45—02 55	Iv	70	4	5	+40	3.4	4.3	0.8
412	134.2	1949 VIII. 7.	01 45—02 55	C	70	1	5	+40	0.9	4.3	0.2
413	134.3	1948 VIII. 6.	21 30—22 50	B	70	4	4	+ 1	3.4	3.2	1.1
414	134.4	1948 VIII. 6.	23 40—00 20	B	35	1	2	+18	1.7	3.7	0.5
415	134.8	1946 VIII. 7.	21 06—21 36	K	28	1	1	— 5	2.1	3.0	0.7
416	135.3	1948 VIII. 7.	22 30—23 30	B	50	5	3	+ 9	6.0	3.4	1.8
417	135.9	1946 VIII. 9.	02 05—03 05	Za	55	1	4	+43	1.1	4.4	0.2
418	136.2	1948 VIII. 8.	21 12—23 20	P	120	6	7	+ 3	3.0	3.3	0.9
419	136.2	1948 VIII. 8.	21 15—23 00	B	85	10	5	+ 1	7.1	3.2	2.2
420	136.9	1946 VIII. 10.	01 05—02 45	M	85	6	6	+37	4.2	4.2	1.0
421	138.2	1948 VIII. 11.	00 50—01 20	M	20	3	1	+30	9.0	4.1	2.2
422	138.4	1947 VIII. 11.	23 00—23 30	M	30	1	2	+12	2.0	3.5	0.6
423	139.4	1947 VIII. 12.	23 10—23 41	K	30	4	2	+14	8.0	3.6	2.2
424	142.2	1947 VIII. 15.	21 00—21 30	P	30	2	2	— 5	4.0	3.0	1.3
425	142.2	1947 VIII. 15.	21 10—21 40	K	30	3	2	— 3	6.0	3.1	1.9
426	142.2	1947 VIII. 15.	21 40—22 10	K	30	3	2	0	6.0	3.2	1.9

No	☉	Date	Time M. E. T.	Obs.	τ	n_o	n_c	H	f_o	f_c	F
427	142.2	1947 VIII. 15.	22 10—22 40	K	30	2	2	+ 5	4.0	3.3	1.2
428	142.3	1947 VIII. 16.	02 00—03 00	M	20	0	1	+44	0.0	4.4	0.0
429	142.4	1947 VIII. 16.	01 40—02 10	K	30	2	2	+38	4.0	4.3	0.9
430	142.4	1947 VIII. 16.	02 10—02 40	K	30	2	2	+43	4.0	4.4	0,9
431	143.2	1947 VIII. 16.	22 04—22 45	K	30	2	2	+ 5	4.0	3.3	1.2
432	143.3	1947 VIII. 17.	01 45—02 30	K	40	3	3	+40	4.5	4.3	1.0
433	143.5	1946 VIII. 17.	00 40—02 12	K	80	4	5	+31	3.0	4.1	0.7
434	144.1	1948 VIII. 17.	01 40—03 20	P	70	6	5	+44	5.1	4.4	1.2
435	145.4	1950 VIII. 19.	00 00—02 00	M	100	9	7	+30	5.4	4.1	1.3
436	145.9	1952 VIII. 18.	23 10—01 30	K	130	7	8	+24	3.2	3.9	0.8
437	145.9	1952 VIII. 18.	23 50—01 00	Ša	60	1	4	+25	1.0	3.9	0.3
438	145.9	1952 VIII. 18.	23 50—01 00	V	60	5	4	+25	5.0	3.9	1.3
439	145.9	1952 VIII. 19.	00 35—03 00	P	135	9	10	+37	4.0	4.2	1.0
440	146.7	1953 VIII. 20.	00 25—01 45	P	70	9	5	+33	7.7	4.1	1.9
441	146.7	1953 VIII. 20.	01 45—02 15	P	25	2	2	+40	4.8	4.3	1.1
442	147.3	1950 VIII. 20.	22 05—23 15	J	50	1	3	+ 8	1.2	3.4	0.4
443	148.2	1950 VIII. 21.	21 45—23 15	J	70	3	4	+ 7	2.6	3.4	0.8
444	148.3	1950 VIII. 21.	23 15—00 45	C	80	6	5	+21	4.5	3.8	1.2
445	149.4	1949 VIII. 22.	21 35—22 05	C	25	0	1	+ 2	0.0	3.2	0.0
446	149.4	1949 VIII. 22.	22 00—00 00	M	90	3	5	+12	2.0	3.5	0.6
447	150.4	1949 VIII. 23.	21 30—23 30	Ča	100	0	6	+ 7	0.0	3.4	0.0
448	150.4	1949 VIII. 23.	21 45—22 15	Bl	30	3	2	+ 3	6.0	3.3	1.8
449	150.6	1952 VIII. 23.	20 15—22 00	P	75	3	4	— 3	2.4	3.1	0.8
450	150.6	1952 VIII. 23.	20 55—22 10	K	65	9	3	— 1	8.3	3.2	2.6
451	150.6	1952 VIII. 23.	22 30—23 30	K	40	3	2	+12	4.4	3.5	1.3
452	150.7	1952 VIII. 24.	00 45—02 40	K	40	0	3	+38	0.0	4.3	0.0
453	150.8	1951 VIII. 24.	21 00—21 40	K	40	0	2	— 2	0.0	3.1	0.0
454	150.9	1947 VIII. 24.	23 00—23 45	K	40	3	2	+15	4.5	3.6	1.2
455	151,0	1947 VIII. 24.	23 00—01 00	M	60	2	4	+22	2.0	3.8	0.6
456	151.0	1947 VIII. 24.	23 40—00 15	P	15	0	1	+21	0.0	3.8	0.0
457	151.0	1947 VIII. 24.	23 45—00 25	K	40	2	3	+23	3.0	3.9	0.8
458	151.3	1949 VIII. 24.	20 20—21 20	K	45	3	2	— 6	4.0	3.0	1.3
459	151.5	1948 VIII. 24.	20 45—21 15	P	30	1	2	— 5	2.0	3.0	0.7
460	151.8	1951 VIII. 25.	21 05—21 45	K	40	2	2	— 1	3.0	3.2	1.0
461	152.3	1949 VIII. 25.	20 45—21 15	K	20	0	1	— 5	0.0	3.0	0.0
462	152.4	1949 VIII. 26.	00 30—03 00	C	140	6	10	+39	2.6	4.3	0.5
463	152.4	1949 VIII. 26.	00 55—01 55	K	60	3	4	+35	3.0	4.2	0.7
464	152.5	1948 VIII. 25.	20 20—21 20	B	50	1	3	— 5	1.2	3.8	0.3
465	152.5	1948 VIII. 25.	20 30—21 50	P	70	2	4	— 3	1.7	3.1	0.5
466	152.5	1949 VIII. 26.	02 35—03 05	K	30	3	2	+48	6.0	4.5	1.3
467	152.8	1951 VIII. 26.	20 35—23 00	P	85	1	5	+ 2	0.7	3.2	0.2
468	153.2	1949 VIII. 26.	21 10—22 00	K	45	1	2	0	1.3	3.2	0.4
469	153.4	1949 VIII. 27.	00 15—02 45	C	140	9	10	+36	3.9	4.2	0.9
470	153.9	1951 VIII. 28.	02 00—03 05	K	60	6	4	+45	6.0	4.4	1.4
471	154.0	1946 VIII. 27.	20 30—22 20	M	90	3	5	— 1	2.0	3.2	0.6
472	154.2	1946 VIII. 28.	01 07—02 55	K	97	2	7	+41	1.2	4.3	0.3
473	154.8	1951 VIII. 28.	23 25—00 55	K	35	2	2	+24	3.4	3.9	0.9
474	154.8	1951 VIII. 28.	23 55—02 00	P	90	8	6	+31	5.3	4.1	1.3
475	154.9	1946 VIII. 28.	20 40—21 15	M	35	4	2	— 5	6.9	3.0	2.3
476	155.0	1946 VIII. 28.	21 53—22 23	Ha	30	1	2	+ 5	2.0	3.3	0.6
477	155.1	1946 VIII. 28.	23 30—00 13	B	43	2	3	+20	2.8	3.8	0.7
478	155.1	1946 VIII. 29.	00 25—02 45	K	130	7	9	+37	3.2	4.2	0.8
479	155.1	1946 VIII. 29.	00 58—03 13	M	110	4	8	+43	2.2	4.4	0.5
480	155.3	1949 VIII. 28.	22 30—00 40	K	60	4	4	+18	4.0	3.7	1.1
481	155.4	1948 VIII. 28.	20 20—21 00	M	30	2	2	— 6	4.0	3.0	1.3
482	156.1	1949 VIII. 29.	21 30—22 35	C	60	6	3	— 3	6.0	3.1	1.9
483	156.2	1949 VIII. 29.	21 45—23 15	Bl	80	1	5	+ 8	0.8	3.4	0.2
484	156.3	1949 VIII. 30.	00 00—00 40	M	40	5	3	+25	7.5	3.9	1.9
485	156.8	1951 VIII. 31.	00 20—01 45	K	75	11	5	+33	8.8	4.1	2.1
486	156.9	1951 VIII. 31.	02 00—03 30	P	80	7	6	+48	5.2	4.5	1.2
487	157.0	1946 VIII. 30.	22 30—00 05	M	80	3	5	+15	2.2	3.6	0.6
488	157.2	1949 VIII. 30.	23 00—01 00	M	120	15	8	+22	7.5	3.8	2.0
489	157.3	1948 VIII. 30.	20 30—21 20	C	40	5	2	— 4	7.5	3.1	2.4
490	157.4	1948 VIII. 30.	21 00—22 25	B	70	8	4	+ 2	6.9	3.2	2.2
491	157.8	1950 VIII. 31.	20 00—20 50	B	40	1	2	— 8	1.5	3.0	0.5
492	158.1	1946 IX. 1.	02 00—03 30	M	80	4	6	+48	3.0	4.5	0.7
493	158.1	1953 VIII. 31.	20 10—20 40	P	15	1	1	— 8	4.0	3.0	1.3
494	158.1	1953 VIII. 31.	21 00—21 30	K	30	0	2	— 2	0.0	3.1	0.0
495	158.1	1953 VIII. 31.	21 05—21 40	V	30	0	2	— 1	0.0	3.2	0.0
496	158.2	1949 VIII. 31.	23 05—00 55	K	100	7	6	+22	4.2	3.8	1.1
497	158.3	1949 IX. 1.	01 00—03 20	M	140	30	10	+43	12.9	4.4	2.9

No	$\odot$	Date	Time M. E. T.	Obs.	τ	n_o	n_s	H	f_o	f_c	F
498	158.6	1948 VIII. 31.	22 00—23 45	M	105	16	6	+12	9.1	3.5	2.6
499	158.6	1951 IX. 1.	21 45—23 35	P	70	6	4	+10	5.1	3.5	1.5
500	158.6	1951 IX. 1.	23 15—23 55	K	35	2	2	+18	3.4	3.7	0.9
501	158.9	1946 IX. 2.	00 00—01 15	D	60	4	4	+28	4.0	4.0	1.0
502	159.1	1953 IX. 1.	20 10—22 00	K	100	10	5	— 3	6.0	3.1	1.9
503	159.1	1953 IX. 1.	20 15—21 50	V	80	6	4	— 3	4.5	3.1	1.5
504	159.9	1946 IX. 3.	00 00—00 50	M	45	2	3	+27	2.7	4.0	0.7
505	160.1	1953 IX. 2.	21 10—22 15	P	60	3	3	+ 2	3.0	3.2	0.9
506	160.1	1953 IX. 2.	22 15—23 40	V	45	2	3	+12	2.7	3.5	0.8
507	160.1	1953 IX. 2.	23 05—23 50	P	40	2	2	+17	3.0	3.7	0.8
508	160.5	1951 IX. 3.	21 00—22 20	K	50	2	3	+ 2	2.4	3.2	0.8
509	160.9	1946 IX. 4.	00 40—01 42	P	57	6	4	+35	6.3	4.2	1.5
510	161.2	1948 IX. 3.	20 05—22 15	C	50	3	3	— 2	3.6	3.1	1.2
511	161.2	1948 IX. 3.	20 40—21 40	K	55	3	3	— 2	3.3	3.1	1.1
512	161.2	1948 IX. 3.	21 10—22 15	B	60	2	3	+ 2	2.0	3.2	0.6
513	161.2	1949 IX. 4.	02 40—03 30	M	40	3	3	+51	4.5	4.6	1.0
514	161.8	1946 IX. 4.	21 45—23 24	K	84	8	5	+10	5.7	3.5	1.6
515	161.8	1946 IX. 4.	22 10—23 00	B	45	0	3	+10	0.0	3.5	0.0
516	162.2	1949 IX. 5.	02 10—03 30	M	80	7	6	+49	5.2	4.5	1.2
517	162.4	1951 IX. 5.	20 10—22 15	P	100	5	5	— 2	3.0	3.1	1.0
518	162.7	1951 IX. 6.	02 15—03 45	P	75	9	6	+50	7.2	4.6	1.6
519	162.8	1946 IX. 5.	22 05—23 30	K	75	3	4	+11	2.4	3.5	0.7
520	162.9	1946 IX. 6.	02 00—04 00	K	100	8	8	+50	4.8	4.8	1.0
521	162.9	1946 IX. 6.	02 45—04 00	M	70	5	5	+54	4.3	4.6	0.9
522	163.4	1947 IX. 6.	19 55—20 25	K	30	3	1	— 8	6.0	3.0	2.7
523	163.4	1947 IX. 6.	20 25—20 55	K	30	4	2	— 5	8.0	3.0	2.7
524	163.4	1947 IX. 6.	21 10—21 55	K	45	1	2	+ 1	1.3	3.2	0.4
525	163.4	1951 IX. 6.	20 45—22 15	P	70	3	4	0	2.6	3.2	0.8
526	163.4	1951 IX. 6.	22 30—23 15	K	40	4	2	+12	6.0	3.5	1.7
527	163.7	1946 IX. 6.	21 40—23 50	K	65	3	4	+11	2.8	3.5	0.8
528	163.9	1946 IX. 7.	02 40—03 50	M	65	4	5	+53	3.7	4.6	0.8
529	164.3	1951 IX. 7.	19 55—21 25	K	90	6	5	— 6	4.0	3.0	1.3
530	164.5	1947 IX. 8.	00 25—01 10	K	30	2	2	+30	4.0	4.1	1.0
531	164.6	1951 IX. 8.	01 20 03 45	P	130	17	10	+47	7.8	4.5	1.7
532	164.9	1953 IX. 7.	20 00—21 10	V	50	0	3	— 6	0.0	3.0	0.0
533	164.9	1953 IX. 7.	20 00—22 25	K	120	12	6	— 2	6.0	3.1	1.9
534	165.3	1948 IX. 8.	02 00—03 20	M	80	8	6	+48	6.0	4.5	1.3
535	165.3	1848 IX. 8.	02 15—03 20	K	60	6	5	+50	6.0	4.6	1.3
536	165.4	1947 IX. 8.	23 15—23 45	K	20	0	1	+18	0.0	3.7	0.0
537	166.1	1948 IX. 8.	21 20—23 15	K	55	6	3	+ 7	6.5	3.4	1.9
538	166.1	1948 IX. 8.	21 45—23 35	C	90	6	5	+11	4.0	3.5	1.1
539	166.1	1953 IX. 9.	02 03—02 45	P	40	2	3	+46	3.0	4.5	0.7
540	166.1	1953 IX. 9.	03 00—03 40	P	40	5	3	+54	7.5	4.6	1.6
541	166.2	1948 IX. 8.	23 15—23 55	K	40	3	2	+19	4.5	3.7	1.2
542	167.1	1953 IX. 10.	02 40—03 43	P	60	4	5	+52	4.0	4.6	0.9
543	167.3	1948 IX. 10.	01 30—03 30	K	90	10	7	+47	6.7	4.5	1.5
544	167.4	1947 IX. 11.	00 03—01 03	M	54	4	4	+28	4.4	4.0	1.1
545	167.7	1949 IX. 10.	19 15—19 45	K	30	0	1	—12	0.0	2.9	0.0
546	168.0	1952 IX. 10.	20 30—21 30	V	50	4	3	— 3	4.8	3.1	1.5
547	168.0	1952 IX. 10.	20 45—22 00	K	65	5	3	0	4.6	3.2	1.4
548	168.1	1948 IX. 10.	22 05—00 30	K	120	13	7	+16	6.5	3.7	1.8
549	168.1	1948 IX. 10.	22 20—23 30	C	60	2	4	+13	2.0	3.6	0,6
550	168.2	1947 IX. 11.	19 35—20 05	K	30	3	1	—10	6.0	2.9	2.1
551	168,2	1947 IX. 11.	20 05—20 35	K	30	4	1	— 7	8.0	3.0	2.7
552	168.3	1947 IX. 11.	22 05—23 45	K	46	4	3	+18	5.2	3.7	1.4
553	168.4	1947 IX. 11.	23 45—00 15	K	20	4	1	+23	12.0	3.9	3.1
554	168.4	1947 IX. 12.	00 15—01 15	K	50	4	3	+33	4.8	4.1	1.2
555	168.4	1947 IX. 12.	01 15—01 45	K	30	3	2	+37	6.0	4.2	1.4
556	168.5	1947 IX. 12.	01 45—02 15	K	25	1	2	+42	2.4	4.4	0.5
557	168.5	1950 IX. 11.	21 30—23 30	J	60	4	3	+10	4.0	3.5	1.1
558	168.5	1951 IX. 12.	02 05—03 25	K	75	2	6	+49	1.6	4.5	0.4
559	168.7	1949 IX. 11.	19 20—20 05	K	45	5	2	—11	6.7	2.9	2.3
560	169.0	1953 IX. 12.	02 45—03 45	P	55	4	4	+53	4.4	4.6	1.0
561	169.2	1948 IX. 12.	02 45—03 50	C	60	10	5	+54	10.0	4.6	2.2
562	169.2	1948 IX. 12.	02 50—03 45	K	50	7	4	+54	8.4	4.6	1.8
563	169.3	1947 IX. 12.	22 20—00 00	M	30	1	2	+15	2.0	3.6	0.6
564	170.1	1948 IX. 13.	01 00—01 25	K	20	0	1	+35	0.0	4.2	0.0
565	170.2	1947 IX. 13.	20 20—20 50	K	30	3	2	— 6	6.0	3.0	2.0
566	170.3	1947 IX. 13.	22 55—23 50	M	30	3	2	+17	6.0	3.7	1.6
567	170.4	1946 IX. 13.	19 15—20 15	K	55	2	3	—10	2.2	2.9	0.8
568	170.5	1950 IX. 13.	22 00—23 45	Ln	105	4	6	+13	2.3	3.6	0.6

No	⊙	Date	Time M. E. T.	Obs.	τ	n_o	n_c	H	f_o	f_c	F
569	170.5	1950 IX. 13.	22 00—00 00	J	60	8	4	+14	8.0	3.6	2.2
570	170.6	1946 IX. 13.	22 50—00 25	K	80	2	5	+19	1.5	3.7	0.4
571	170.9	1949 IX. 14.	03 00—04 00	M	50	1	4	+55	1.2	4.7	0.3
572	171.4	1947 IX. 15.	00 30—01 40	M	40	2	3	+34	3.0	4.2	0.7
573	171.4	1947 IX. 15.	02 40—03 40	P	40	1	3	+53	1.5	4.6	0.3
574	171.6	1949 IX. 14.	19 14—20 45	M	60	5	3	— 9	5.0	2.9	1.7
575	171.6	1949 IX. 14.	19 30—21 00	K	70	5	3	— 7	4.3	3.0	1.4
576	171.6	1950 IX. 15.	01 00—03 00	Ln	110	7	8	+42	3.8	4.4	0.9
577	171.6	1950 IX. 15.	01 00—03 00	J	110	5	8	+42	2.7	4.4	0.6
578	171.6	1950 IX. 15.	02 00—03 50	M	110	14	8	+50	7.6	4.6	1.7
579	171.9	1949 IX. 15.	03 00—04 00	M	60	4	5	+55	4.0	4.7	0.9
580	172.4	1947 IX. 16.	01 45—02 40	K	21	3	2	+44	8.7	4.4	2.0
581	172.4	1947 IX. 16.	02 46—03 46	P	55	2	4	+53	2.2	4.6	0.5
582	172.4	1947 IX. 16.	03 00—04 00	M	55	2	4	+55	2.2	4.7	0.5
583	172.6	1949 IX. 15.	19 50—21 30	M	100	5	5	— 5	3.0	3.0	1.0
584	172.6	1949 IX. 15.	20 20—21 20	K	45	3	2	— 4	4.0	3.1	1.3
585	172.8	1953 IX. 16.	00 30—01 00	K	25	2	2	+30	4.8	4.1	1.2
586	172.9	1953 IX. 16.	01 25—02 23	P	50	7	4	+41	8.4	4.3	2.0
587	172.9	1953 IX. 16.	03 06—03 56	P	50	4	4	+55	4.8	4.7	1.0
588	173.0	1952 IX. 16.	00 00—02 30	V	120	9	8	+35	4.5	4.2	1.1
589	173.1	1947 IX. 16.	20 00—20 45	K	40	3	2	— 7	4.5	3.0	1.5
590	173.2	1947 IX. 16.	23 00—00 00	K	40	1	2	+18	1.5	3.7	0.4
591	173.4	1947 IX. 17.	01 40—03 40	M	60	5	4	+48	5.0	4.5	1.1
592	173.9	1952 IX. 16.	22 00—23 15	V	60	5	3	+10	5.0	3.5	1.4
593	173.9	1952 IX. 16.	22 30—23 45	K	45	4	3	+15	5.3	3.6	1.5
594	174.2	1947 IX. 17.	22 45—23 15	K	27	3	2	+14	6.7	3.6	1.9
595	174.3	1947 IX. 18.	01 45—03 30	M	105	5	8	+48	2.9	4.5	0.6
596	174.3	1947 IX. 18.	01 50—03 00	K	65	1	5	+47	0.9	4.5	0.2
597	174.3	1947 IX. 18.	02 00—03 20	P	55	2	4	+47	2.2	4.5	0.5
598	174.4	1946 IX. 17.	21 40—22 30	D	45	4	3	+ 6	5.3	3.4	1.6
599	174.4	1947 IX. 18.	02 30—04 00	M	40	1	3	+53	1.5	4.6	0.3
600	174.6	1946 IX. 18.	03 15—04 15	K	55	4	4	+57	4.4	4.7	0.9
601	175.4	1946 IX. 18.	22 55—23 30	K	35	2	2	+16	3.4	3.7	0.9
602	175.5	1949 IX. 18.	20 40—21 15	K	25	3	1	— 3	7.2	3.1	2.3
603	175.6	1949 IX. 18.	21 15—21 55	K	35	2	2	+ 2	3.4	3.2	1.1
604	175.6	1949 IX. 18.	22 40—23 10	K	30	4	2	+13	8.0	3.6	2.2
605	175.7	1949 IX. 18.	23 10—23 40	K	30	4	2	+18	8.0	3.7	2.2
606	175.7	1949 IX. 18.	23 40—00 25	K	40	9	3	+24	13.5	3.9	3.5
607	175.8	1952 IX. 18.	21 30—22 45	P	65	3	4	+ 6	2.8	3.4	0.8
608	176.1	1947 IX. 19.	21 05—22 00	K	55	3	3	+ 3	3.3	3.3	1.0
609	176.1	1947 IX. 19.	22 00—22 30	K	25	0	1	+ 8	0.0	3.4	0.0
610	176.1	1947 IX. 19.	22 30—23 10	K	40	6	2	+11	9.0	3.5	2.6
611	176.6	1949 IX. 19.	22 00—00 30	M	150	6	9	+16	2.4	3.7	0.6
612	177.1	1947 IX. 20.	22 00—22 30	K	30	1	2	+ 7	2.0	3.4	0.6
613	177.1	1947 IX. 20.	22 30—23 00	K	28	3	2	+11	6.4	3.5	1.8
614	177.2	1947 IX. 20.	23 00—23 30	K	30	2	2	+16	4.0	3.7	1.1
615	177.8	1949 IX. 21.	02 40—04 10	M	90	6	7	+55	4.0	4.7	0.9
616	178.7	1952 XI. 21.	19 20—21 25	P	55	6	3	— 7	6.5	3.0	2.2
617	179.0	1952 IX. 22.	01 55—04 00	P	110	11	8	+50	6.0	4.6	1.3
618	179.5	1949 IX. 22.	20 10—21 30	P	60	3	3	— 4	3.0	3.1	1.0
619	179.9	1951 IX. 23.	19 00—20 00	K	60	1	3	—11	1.0	2.9	0.3
620	180.4	1949 IX. 23.	20 10—21 10	B	60	0	3	— 5	0.0	3.0	0.0
621	180.5	1949 IX. 23.	20 45—22 10	K	80	9	4	0	6.8	3.2	2.1
622	181.4	1949 IX. 24.	20 45—21 50	K	45	2	2	0	2.7	3.2	0.8
623	181.6	1948 IX. 24.	19 15—20 00	B	40	1	2	—11	1.5	2.9	0.5
624	181.7	1949 IX. 25.	02 00—04 20	M	130	16	10	+53	7.4	4.6	1.6
625	182.2	1947 IX. 26.	03 15—04 10	M	50	6	4	+56	7.2	4.7	1.5
626	182.2	1947 IX. 26.	03 15—04 10	P	50	2	4	+56	2.4	4.7	0.5
627	182.4	1946 IX. 26.	01 00—01 30	M	30	2	2	+35	4.0	4.2	1.0
628	182.4	1949 IX. 25.	21 10—22 10	B	50	2	3	+ 2	2.4	3.2	0.8
629	182.4	1949 IX. 25.	21 45—22 15	K	20	1	1	+ 2	3.0	3.2	0.9
630	182.5	1946 IX. 26.	03 37—04 20	D	36	5	3	+58	8.3	4.7	1.9
631	182.6	1948 IX. 25.	19 30—20 50	B	70	2	3	—10	1.7	2.9	0.6
632	182.6	1948 IX. 25.	19 40—21 00	M	60	2	3	— 7	2.0	3.0	0.7
633	182.7	1949 IX. 26.	02 30—04 00	M	90	16	7	+53	10.7	4.6	2.3
634	183.2	1946 IX. 26.	22 15—23 15	B	55	6	3	+11	6.5	3.5	1.9
635	183.4	1946 IX. 26.	23 20—23 50	K	25	5	2	+18	12.0	3.7	3.2
636	183.4	1946 IX. 27.	01 45—02 40	K	50	4	4	+43	4.8	4.4	1.1
637	183.4	1949 IX. 26.	21 15—21 50	B	30	1	2	+ 1	2.0	3.2	0.6
638	183.5	1946 IX. 27.	03 30—04 15	M	55	9	4	+57	9.8	4.7	2.1
639	183.6	1948 IX. 26.	19 40—21 40	M	80	12	4	— 5	9.0	3.0	3.0

No	⊙	Date		Time M. E. T.	Obs.	τ	n_o	n_c	H	f_o	f_c	F
640	183.6	1948	IX. 26.	20 40—21 25	B	40	3	2	— 2	4.5	3.1	1.5
641	183.6	1949	IX. 27.	02 00—04 05	M	80	4	6	+51	3.0	4.6	0.7
642	183.7	1952	IX. 27.	03 15—04 20	K	60	7	5	+56	7.0	4.7	1.5
643	183.9	1952	IX. 27.	03 25—04 20	V	40	0	3	+57	0.0	4.7	0.0
644	184.6	1948	IX. 27.	20 20—21 00	M	30	0	2	— 5	0.0	3.0	0.0
645	185.3	1946	IX. 28.	23 10—01 30	M	70	5	5	+26	4.3	3.9	1.1
646	185.3	1953	IX. 28.	19 00—20 00	V	50	4	2	—12	4.8	2.9	1.7
647	185.3	1953	IX. 28.	19 25—20 30	P	55	4	3	—10	4.4	2.9	1.5
648	185.4	1946	IX. 29.	01 20—02 00	K	30	3	2	+39	6.0	4.3	1.4
649	185.4	1946	IX. 29.	02 00—02 50	K	48	4	4	+44	5.0	4.4	1.1
650	185.4	1946	IX. 29.	03 00—03 30	K	20	2	2	+53	6.0	4.6	1.3
651	185.4	1946	IX. 29.	03 30—04 00	K	25	2	2	+56	4.8	4.7	1.0
652	185.4	1946	IX. 29.	04 00—04 30	K	27	1	2	+60	2.2	4.8	0.5
653	186.0	1946	IX. 29.	18 45—19 45	M	60	2	3	—13	2.0	2.8	0.7
654	186.1	1946	IX. 29.	19 08—19 48	K	40	5	2	—12	7.5	2.9	2.6
655	186.3	1946	IX. 30.	00 55—01 30	D	30	4	2	+35	8.0	4.2	1.9
656	186.3	1946	IX. 30.	01 30—02 00	D	20	5	1	+40	15.0	4.3	3.5
657	186.3	1946	IX. 30.	02 00—02 30	D	27	6	2	+44	13.3	4.4	3.0
658	186.4	1946	IX. 30.	02 30—03 00	D	27	8	2	+48	17.8	4.5	4.0
659	186.4	1946	IX. 30.	03 19—04 20	D	47	4	4	+55	5.1	4.7	1.1
660	186.6	1948	IX. 29.	21 00—21 50	B	45	4	2	0	5.3	3.2	1.7
661	186.6	1949	IX. 30.	02 40—04 10	D	90	12	7	+54	8.0	4.6	1.7
662	186.8	1951	IX. 30.	19 55—20 55	K	55	5	3	— 7	5.5	3.0	1.8
663	187.1	1951	X. 1.	02 15—04 15	K	110	7	8	+53	3.8	4.6	0.8
664	187.2	1946	IX. 30.	23 50—00 25	K	35	3	2	+25	5.1	3.9	1.3
665	187.3	1946	X. 1.	01 00—01 50	K	50	7	3	+35	8.4	4.2	2.0
666	187.3	1953	IX. 30.	19 50—20 45	P	40	1	2	— 8	1.5	3.0	0.5
667	187.4	1946	X. 1.	03 00—03 30	M	30	5	2	+53	10.0	4.6	2.2
668	187.4	1946	X. 1.	03 30—04 20	M	40	2	3	+57	3.0	4.7	0.6
669	187.6	1949	X. 1.	03 30—04 15	M	40	3	3	+57	4.5	4.7	1.0
670	187.8	1952	X. 1.	03 45—04 30	V	35	2	3	+59	3.4	4.7	0.7
671	188.2	1946	X. 1.	22 00—23 20	M	80	4	5	+10	3.0	3.5	0.9
672	188.3	1946	X. 2.	02 35—03 52	K	77	8	6	+53	6.2	4.6	1.3
673	188.3	1953	X. 1.	19 15—20 20	V	50	2	2	—11	2.4	2.9	0.8
674	188.3	1953	X. 1.	19 30—20 20	Ša	35	2	2	—10	3.4	2.9	1.2
675	188.4	1953	X. 1.	22 15—22 45	K	30	2	2	+ 9	4.0	3.4	1.2
676	189.3	1953	X. 2.	19 25—20 10	V	30	3	1	—11	6.0	2.9	2.1
677	189.7	1947	X. 3.	18 30—19 10	M	40	1	2	—15	1.5	2.8	0.5
678	190.3	1953	X. 3.	20 45—22 15	Ša	65	3	3	0	2.8	3.2	0.9
679	190.5	1953	X. 3.	01 30—02 40	K	60	9	4	+41	9.0	4.3	2.1
680	190.5	1953	X. 4.	01 40—03 10	P	80	4	6	+45	3.0	4.4	0.7
681	191.0	1950	X. 4.	20 50—22 10	P	60	3	3	0	3.0	3.2	0.9
682	192.0	1946	X. 5.	20 07—20 42	K	35	2	2	— 8	3.4	3.0	1.1
683	192.5	1948	X. 5.	20 50—21 30	B	45	5	2	— 2	6.7	3.1	2.2
684	192.8	1948	X. 6.	02 55—04 15	P	70	11	5	+55	9.4	4.7	2.0
685	192.9	1950	X. 6.	19 45—21 00	P	95	11	5	— 8	6.9	3.0	2.3
686	193.5	1948	X. 6.	20 40—21 30	B	45	8	2	— 3	10.7	3.1	3.5
687	193.7	1947	X. 7.	19 30—20 05	B	35	1	2	—11	1.7	2.9	0.6
688	193.7	1947	X. 7.	20 40—21 20	M	40	2	2	— 4	3.0	3.1	1.0
689	194.0	1950	X. 7.	20 00—22 00	J	110	9	6	— 4	4.9	3.1	1.6
690	194.2	1946	X. 8.	03 35—04 08	K	33	0	3	+56	0.0	4.7	0.0
691	194.3	1952	X. 7.	18 30—19 25	P	45	1	2	—15	1.3	2.8	0.5
692	194.9	1950	X. 8.	18 45—19 45	J	50	4	2	—14	4.8	2.8	1.7
693	194.9	1950	X. 8.	18 45—20 45	P	100	11	5	—11	6.6	2.9	2.3
694	195.0	1950	X. 8.	20 20—22 40	B	65	4	3	0	3.7	3.2	1.2
695	195.0	1950	X. 8.	22 00—23 00	J	50	2	3	+ 8	2.4	3.4	0.7
696	195.4	1948	X. 8.	19 30—20 50	B	70	5	3	—10	4.3	2.9	1.5
697	196.0	1947	X. 10.	03 49—04 26	M	37	1	3	+57	1.6	4.7	0.3
698	196.1	1950	X. 10.	00 10—01 30	P	50	4	3	+30	4.8	4.1	1.2
699	196.4	1952	X. 9.	20 15—20 55	K	30	1	1	— 7	2.0	3.0	0.7
700	196.5	1948	X. 9.	21 25—22 20	B	50	6	3	+ 3	7.2	3.3	2.2
701	196.9	1946	X. 10.	18 08—18 53	K	45	4	2	—16	5.3	2.8	1.9
702	197.0	1946	X. 10.	21 23—22 12	K	45	1	2	+ 1	1.3	3.2	0.4
703	197.0	1950	X. 10.	22 00—23 10	P	50	5	3	+ 9	6.0	3.4	1.8
704	197.8	1951	X. 12.	03 00—04 25	K	80	5	5	+28	3.8	4.0	1.0
705	199.1	1949	X. 12.	19 00—20 30	P	80	2	4	—12	1.5	2.9	0.5
706	199.6	1947	X. 13.	19 15—20 00	P	45	5	2	—13	6.7	2.8	2.4
707	199.8	1947	X. 13.	23 25—00 23	M	53	0	3	+20	0.0	3.8	0.0
708	199.9	1946	X. 13.	20 00—20 50	B	50	4	2	— 9	4.8	2.9	1.7
709	200.1	1949	X. 13.	18 30—20 30	P	100	4	5	—13	2.5	2.8	0.9
710	200.6	1947	X. 14.	18 22—19 05	M	43	1	2	—16	1.4	2.8	0.5

No	⊙	Date	Time M. E. T.	Obs.	τ	n_o	n_c	H	f_o	f_c	F
711	200.8	1946 X. 14.	18 00—18 30	K	30	6	1	—17	12.0	2.7	4.4
712	200.8	1946 X. 14.	18 30—19 00	K	28	2	1	—16	4.3	2.8	1.5
713	200.8	1950 X. 14.	18 20—20 00	P	90	4	4	—15	2.7	2.8	1.0
714	200.9	1950 X. 14.	20 10—21 00	B	45	3	2	— 9	4.0	2.9	1.4
715	201.4	1952 X. 14.	21 40—22 50	P	45	1	2	+ 5	1.3	3.3	0.4
716	201.4	1952 X. 14.	22 15—22 45	Pa	30	3	2	+ 7	6.0	3.4	1.8
717	201.6	1952 X. 15.	02 10—03 35	P	65	3	5	+47	2.8	4.5	0.6
718	201.7	1952 X. 15.	03 55—04 45	K	50	2	4	+58	2.4	4.7	0.5
719	201.8	1946 X. 15.	19 10—19 50	K	35	1	2	—14	1.7	2.8	0.6
720	201.8	1950 X. 15.	18 20—19 00	B	35	1	2	—16	1.7	2.8	0.6
721	201.8	1950 X. 15.	19 10—21 00	P	90	6	4	—11	4.0	2.9	1.4
722	201.9	1950 X. 15.	21 30—23 00	J	90	6	5	+ 5	4.0	3.3	1.2
723	202.0	1947 X. 16.	04 06—04 45	M	39	4	3	+59	6.2	4.7	1.3
724	202.2	1950 X. 16.	03 35—04 45	P	60	7	5	+57	7.0	4.7	1.5
725	202.2	1950 X. 16	04 00—04 40	B	35	2	3	+58	3.4	4.7	0.7
726	202.6	1952 X. 16.	02 20—04 00	P	50	4	4	+50	4.8	4.6	1.0
727	202.9	1946 X. 16.	20 20—21 20	K	45	2	2	— 6	2.7	3.0	0.9
728	203.0	1946 X. 16.	22 00—23 00	P	50	1	3	+ 6	1.2	3.4	0.4
729	203.0	1949 X. 16.	18 30—20 15	P	120	8	6	—15	4.0	2.8	1.4
730	203.2	1950 X. 17.	03 10—04 44	P	80	8	6	+55	6.0	4.7	1.3
731	203.5	1952 X. 16.	23 30—00 30	Pa	45	3	3	+20	4.0	3.8	1.1
732	204.4	1952 X. 17.	21 50—22 40	K	45	1	2	+ 5	1.3	3.3	0.4
733	204.4	1952 X. 17.	22 35—23 05	V	30	2	2	+10	4.0	3.5	1.1
734	204.4	1953 X. 18.	03 30—04 00	K	20	0	2	+54	0.0	4.6	0.0
735	204.5	1952 X. 17.	23 10—00 55	P	95	4	6	+20	2.5	3.8	0.7
736	204.7	1952 X. 18.	04 10—04 40	K	30	0	2	+24	0.0	3.9	0.0
737	205.4	1949 X. 19.	03 05—05 00	P	115	10	9	+56	5.2	4.7	1.1
738	205.5	1952 X. 19.	01 35—02 35	P	60	3	4	+40	3.0	4.3	0.7
739	205.8	1946 X. 19.	18 40—19 20	M	80	6	4	—16	4.5	2.8	1.6
740	205.9	1946 X. 19.	21 20—22 20	P	40	2	2	0	3.0	3.2	0.9
741	206.4	1949 X. 20.	03 02—04 40	P	90	10	7	+55	6.7	4.7	1.4
742	207.2	1946 X. 21.	04 40—05 10	K	30	1	2	+60	2.0	4.8	0.4
743	207.4	1949 X. 21.	03 40—04 55	P	70	11	5	+57	9.4	4.7	2.0
744	208.0	1949 X. 21.	19 20 21 00	P	100	9	5	—11	5.4	2.9	1.9
745	208.2	1948 X. 21.	17 45—18 30	P	35	2	2	—18	3.4	2.7	1.3
746	208.2	1948 X. 21.	17 45—18 30	M	35	4	2	—18	6.9	2.7	2.6
747	208.9	1947 X. 23.	04 17—04 50	P	33	2	3	+58	3.6	4.7	0.8
748	208.9	1947 X. 23.	04 18—04 50	B	29	3	2	+58	6.2	4.7	1.3
749	208.9	1947 X. 23.	04 18—04 50	M	32	3	3	+58	5.6	4.7	1.2
750	209.1	1949 X. 22.	20 00—21 45	P	90	3	4	— 7	2.0	3.0	0.7
751	209.2	1948 X. 22.	17 50—19 10	M	60	4	3	—18	4.0	2.7	1.5
752	209.2	1950 X. 23.	03 50—05 00	P	60	4	5	+59	4.0	4.7	0.9
753	209.3	1948 X. 22.	17 50—20 20	P	120	6	6	—16	3.0	2.8	1.1
754	209.5	1952 X. 23.	01 30—02 55	P	70	3	5	+40	2.6	4.3	0.6
755	209.8	1947 X. 24.	01 30—03 15	P	70	11	5	+42	9.4	4.4	2.1
756	210.5	1951 X. 24.	19 05—20 15	P	60	4	3	—15	4.0	2.8	1.4
757	210.5	1952 X. 24.	00 30—03 00	P	105	9	7	+35	5.1	4.2	1.2
758	210.6	1951 X. 24.	21 30—23 10	P	95	7	5	+ 4	4.4	3.3	1.3
759	210.9	1947 X. 25.	02 46—03 35	P	40	6	3	+49	9.0	4.5	2.0
760	210.9	1947 X. 25.	04 05—04 55	M	45	8	4	+57	10.1	4.7	2.1
761	211.3	1952 X. 24.	19 50—20 25	K	30	1	1	—12	2.0	2.9	0.7
762	211.3	1952 X. 24.	21 20—22 10	V	40	3	2	— 1	4.5	3.2	1.4
763	211.8	1946 X. 25.	18 07—19 20	K	60	3	3	—18	3.0	2.7	1.1
764	211.8	1946 X. 25.	19 55—20 30	K	30	2	1	—11	4.0	2.9	1.4
765	211.8	1946 X. 25.	20 30—21 00	K	20	1	1	— 9	3.0	2.9	1.0
766	211.9	1946 X. 25.	21 00—21 30	K	30	1	2	— 5	2.0	3.0	0.7
767	211.9	1946 X. 25.	21 30—22 00	K	25	2	1	— 1	4.8	3.2	1.5
768	211.9	1946 X. 25.	22 00—22 30	K	30	3	2	+ 3	6.0	3.3	1.8
769	211.9	1946 X. 25.	22 30—23 00	K	30	2	2	+ 7	4.0	3.4	1.2
770	212.1	1949 X. 25.	21 20—22 40	P	65	4	3	0	3.7	3.2	1.2
771	212.3	1948 X. 25.	18 00—20 30	P	120	8	6	—16	4.0	2.8	1.4
772	212.4	1949 X. 26.	03 25—05 00	P	85	13	7	+55	9.2	4.7	2.0
773	212.5	1951 X. 26.	18 45—19 30	P	30	1	1	—17	2.0	2.7	0.7
774	212.9	1946 X. 26.	21 30—23 00	K	65	3	4	+ 5	2.8	3.3	0.8
775	212.9	1946 X. 26.	21 40—22 20	M	30	1	2	0	2.0	3.2	0.6
776	212.9	1947 X. 27.	03 55—04 55	M	55	4	4	+57	4.4	4.7	0.9
777	212.9	1951 X. 27.	02 50—05 00	P	110	7	9	+54	3.8	4.6	0.8
778	213.0	1946 X. 26.	23 00—23 35	K	25	1	1	+12	2.4	3.5	0.7
779	213.3	1949 X. 27.	02 30—04 45	M	135	12	10	+51	5.3	4.6	1.2
780	213.4	1949 X. 27.	03 30—04 40	P	60	6	5	+55	6.0	4.7	1.3
781	214.0	1953 X. 27.	18 35—19 10	K	35	1	2	—18	1.7	2.7	0.6

No	☉	Date	Time M. E. T.	Obs.	τ	n_o	n_c	H	f_o	f_c	F
782	214.1	1953 X. 27.	19 35—20 15	K	35	1	2	—14	1.7	2.8	0.6
783	214.5	1952 X. 28.	01 10—02 50	P	65	4	5	+37	3.7	4.2	0,9
784	214.6	1952 X. 28.	03 35—04 05	P	20	4	2	+52	12.0	4.6	2.6
785	214.9	1951 X. 29.	03 05—04 49	P	60	3	5	+54	3.0	4.6	0.7
786	215.0	1953 X. 28.	18 00—18 55	K	50	8	2	—20	9.6	2.7	3.6
787	215.0	1953 X. 28.	19 15—20 15	K	40	4	2	—15	6.0	2.8	2.1
788	215.2	1948 X. 28.	17 45—19 10	M	70	2	3	—20	1.7	2.7	0.6
789	215.6	1952 X. 29.	03 35—04 55	V	70	2	5	+55	1.7	4.7	0.4
790	216.9	1946 X. 30.	23 10—23 40	M	30	2	2	+12	4.0	3.5	1.1
791	216.9	1951 X. 31.	03 10—04 50	P	75	2	6	+53	1.6	4.6	0.3
792	217.1	1946 X. 31.	01 55—02 30	K	35	6	3	+39	10.0	4.3	2.3
793	218.6	1948 XI. 1.	03 10—05 10	M	100	12	8	+54	7.2	4.6	1.6
794	221.6	1948 XI. 4.	04 00—04 40	M	40	4	3	+54	6.0	4.6	1.3
795	222.3	1948 XI. 4.	18 00—20 00	M	70	5	3	—20	4.3	2.7	1.6
796	222.9	1951 XI. 6.	03 15—05 20	K	100	8	8	+53	4.8	4.6	1.0
797	224.1	1946 XI. 7.	03 40—04 15	P	35	3	3	+50	5.1	4.6	1.1
798	225.1	1950 XI. 8.	04 00—05 00	J	60	2	5	+53	2.0	4.6	0.4
799	225.3	1952 XI. 7.	20 15—20 45	K	30	1	1	—13	2.0	2.8	0.7
800	225.9	1947 XI. 9.	04 08—05 22	M	69	1	5	+55	0.9	4.7	0.2
801	226.1	1950 XI. 9.	03 00—04 30	J	90	2	7	+49	1.3	4.5	0.3
802	226.9	1950 XI. 9.	21 00—22 00	J	50	1	2	— 7	1.2	3.0	0.4
803	226.9	1950 XI. 9.	21 00—22 00	L	50	3	2	— 7	3.6	3.0	1.2
804	227.9	1950 XI. 10.	21 30—22 00	J	30	2	2	— 5	4.0	3.0	1.3
805	227.9	1950 XI. 10.	21 30—23 45	L	115	4	6	+ 2	2.4	3.2	0.8
806	228.0	1949 XI. 10.	18 30—20 30	M	100	3	4	—20	1.8	2.7	0.7
807	228.0	1950 XI. 11.	00 00—01 00	J	50	4	3	+20	4.8	3.8	1.3
808	229.4	1952 XI. 11.	22 15—22 45	K	30	2	2	+ 1	4.0	3.2	1.2
809	229.4	1952 XI. 11.	23 30—00 00	V	30	2	2	+13	4.0	3.6	1.1
810	229.5	1952 XI. 12.	00 30—02 30	P	105	6	7	+30	3.4	4.1	0.8
811	229.7	1952 XI. 12.	04 40—05 10	K	30	0	2	+54	0.0	4.6	0.0
812	230.7	1946 XI. 13.	17 30—18 10	P	40	2	2	—25	3.0	2.5	1.2
813	230.7	1948 XI. 13.	04 20—05 20	P	55	5	4	+53	5.5	4.6	1.2
814	231.0	1949 XI. 13.	18 20—19 20	B	60	3	3	—23	3.0	2.6	1.2
815	231.6	1947 XI. 14.	19 30—20 30	M	55	0	2	—19	0.0	2.7	0.0
816	232.3	1952 XI. 14.	18 35—19 55	P	70	5	3	—22	4.3	2.6	1.7
817	232.8	1946 XI. 15.	18 10—19 00	M	45	2	2	—25	2.7	2.5	1.1
818	232.9	1946 XI. 15.	19 20—20 20	P	55	2	2	—20	2.2	2.7	0.8
819	234.3	1946 XI. 17.	04 40—05 35	M	50	3	4	+53	3.6	4.6	0.8
820	234.6	1952 XI. 17.	01 35—03 55	P	75	3	5	+39	2.4	4.3	0.6
821	234.8	1947 XI. 17.	23 55—01 50	M	95	11	6	+22	6.9	3.8	1.8
822	235.0	1947 XI. 18.	04 10—05 10	P	55	5	4	+51	5.5	4.6	1.2
823	235.8	1947 XI. 18.	23 40—01 30	M	90	7	6	+18	4.7	3.7	1.3
824	236.7	1852 XI. 19.	02 50—03 25	P	35	4	3	+42	6.9	4.4	1.6
825	236.7	1852 XI. 19.	03 50—05 30	K	90	9	7	+50	6.0	4.6	1.3
826	236.7	1952 XI. 19.	04 15—05 18	P	60	7	5	+50	7.0	4.6	1.5
827	237.1	1949 XI. 19.	18 40—21 00	B	110	4	5	—21	2.2	2.6	0.8
828	237.2	1950 XI. 20.	04 20—05 00	P	32	2	2	+50	3.8	4.6	0.8
829	237.9	1947 XI. 21.	00 10—02 00	M	90	5	6	+24	3.3	3.9	0.8
830	238.1	1946 XI. 20.	22 30—00 50	M	90	3	5	+10	2.0	3.5	0.6
831	239.2	1949 XI. 21.	19 35—21 35	P	100	9	5	—17	5.4	2.7	2.0
832	239.2	1949 XI. 21.	20 55—21 35	B	40	1	2	—13	1.5	2.8	0.5
833	241.3	1946 XI. 24.	03 00—04 45	M	90	3	7	+45	2.0	4.4	0.5
834	241.3	1946 XI. 24.	03 10—04 40	P	80	1	6	+45	0.8	4.4	0.2
835	241.6	1951 XI. 24.	17 10—18 45	K	85	4	3	—29	2.8	2.5	1.1
836	242.0	1946 XI. 24.	19 50—20 50	B	50	5	2	—20	6.0	2.7	2.2
837	242.7	1952 XI. 25.	00 50—02 00	P	65	2	4	+25	1.8	3.9	0.5
838	242.7	1952 XI. 25.	02 45—04 15	P	75	4	5	+43	3.2	4.4	0.7
839	243.0	1946 XI. 25.	20 05—20 45	B	40	4	2	—20	6.0	2.7	2.2
840	243.7	1952 XI. 26.	02 25—03 00	V	30	3	2	+44	6.0	4.4	1.4
841	243.8	1952 XI. 26.	03 15—05 30	P	125	5	9	+47	2.4	4.5	0.5
842	244.0	1946 XI. 26.	18 50—20 25	B	70	2	3	—25	1.7	2.5	0.7
843	245.5	1948 XI. 27.	18 10—20 40	P	60	1	3	—25	1.0	2.5	0.4
844	245.8	1952 XI. 28.	03 50—05 25	P	70	8	5	+47	6.9	4.5	1.5
845	246.9	1950 XI. 29.	18 00—20 00	J	100	6	4	—28	3.6	2.5	1.4
846	246.9	1950 XI. 29.	18 00—20 00	L	100	4	4	—28	2.4	2.5	1.0
847	247.4	1946 XI. 30.	05 05—06 00	M	50	8	4	+49	9.6	4.5	2.1
848	248.4	1946 XII. 1.	04 15—05 25	M	70	21	5	+47	18.0	4.5	4.0
849	248.7	1951 XII. 1.	18 20—19 30	K	60	5	2	—29	5.0	2.5	2.0
850	249.6	1949 XII. 2.	03 50—06 00	M	100	12	7	+47	7.2	4.5	1.6
851	249.6	1949 XII. 2.	03 50—06 00	P	100	11	7	+47	6.6	4.5	1.5
852	250.7	1947 XII. 3.	17 30—18 30	M	55	1	2	—32	1.1	2.4	0.5

No	⊙	Date	Time M. E. T.	Obs.	τ	n_o	n_c	H	f_o	f_c	F
853	251.8	1947 XII. 4.	19 30—20 12	M	57	1	2	—27	1.1	2.5	0.4
854	251.8	1948 XII. 4.	01 02—02 55	M	75	9	5	+27	7.2	4.0	1.8
855	251.9	1947 XII. 4.	20 30—21 45	F	70	3	3	—17	2.6	2.7	1.0
856	253.4	1946 XII. 6.	03 41—04 15	K	35	1	3	+42	1.7	4.4	0.4
857	253.5	1952 XII. 5.	17 35—18 15	K	35	3	1	—33	5.1	2.4	2.1
858	253.5	1952 XII. 5.	18 35—19 15	K	35	2	1	—31	3.4	2.4	1.4
859	253.8	1947 XII. 6.	19 10—19 40	K	30	1	1	—29	2.0	2.5	0.8
860	253.8	1948 XII. 6.	00 40—02 00	M	100	14	6	+21	8.4	3.8	2.2
861	253.9	1947 XII. 6.	19 30—20 30	Bo	55	1	2	—25	1.1	2.5	0.4
862	253.9	1947 XII. 6.	19 40—20 20	K	40	3	2	—25	4.5	2.5	1.8
863	253.9	1947 XII. 6.	20 00—21 10	F	65	5	3	—22	4.6	2.6	1.8
864	254.0	1947 XII. 6.	22 00—23 40	P	90	3	5	— 3	2.0	3.1	0.6
865	254.7	1948 XII. 6.	21 00—22 40	B	65	5	3	—11	4.6	2.9	1.6
866	255.2	1951 XII. 8.	03 10—05 20	P	100	9	7	+42	5.4	4.4	1.2
867	255.2	1951 XII. 8.	03 50—05 15	K	70	7	5	+43	6.0	4.4	1.4
868	255.9	1948 XII. 8.	02 00—04 00	M	120	20	8	+35	10.0	4.2	2.4
869	256.2	1951 XII. 9.	03 50—05 45	P	90	11	7	+44	7.3	4.4	1.7
870	256.6	1952 XII. 8.	18 00—19 45	P	95	3	4	—32	1.9	2.4	0.8
871	257.0	1948 XII. 9.	03 30—05 00	M	90	20	7	+42	13.3	4.4	3.0
872	257.0	1952 XII. 9.	04 05—04 50	P	45	2	3	+43	2.7	4.4	0.6
873	257.8	1947 XII. 10.	17 40—18 20	M	40	1	2	—35	1.5	2.3	0.7
874	257.8	1947 XII. 10.	17 40—18 20	P	40	1	2	—35	1.5	2.3	0.7
875	257.9	1947 XII. 10.	19 40—20 20	P	40	3	2	—27	4.5	2.5	1.8
876	258.0	1948 XII. 10.	04 00—04 50	P	45	9	3	+42	12.0	4.4	2.7
877	258.8	1947 XII. 11.	17 40—18 10	K	30	2	1	—35	4.0	2.3	1.7
878	258.9	1947 XII. 11.	18 10—18 45	K	30	1	1	—35	2.0	2.3	0.9
879	258.9	1947 XII. 11.	19 30—20 00	K	30	2	1	—29	4.0	2.5	1.6
880	259.0	1947 XII. 11.	20 00—20 30	K	30	5	1	—25	10.0	2.5	4.0
881	259.0	1947 XII. 11.	21 00—21 35	M	35	0	2	—18	0.0	2.7	0.0
882	259.1	1946 XII. 11.	17 20—18 20	K	55	3	2	—35	3.3	2.3	1.4
883	259.1	1946 XII. 11.	17 50—19 10	Bo	65	4	3	—33	3.7	2.4	1.5
884	260.0	1947 XII. 12.	20 00—20 45	Bo	45	2	2	—25	2.7	2.5	1.1
885	260.1	1948 XII. 12.	04 20—04 55	P	30	3	2	+42	6.0	4.4	1.4
886	260.3	1947 XII. 13.	04 00—05 30	M	90	12	7	+42	8.0	4.4	1.8
887	261.1	1946 XII. 13.	17 25—17 55	K	30	2	1	—36	4.0	2.3	1.7
888	261.2	1946 XII. 13.	17 55—18 45	K	45	2	2	—35	2.7	2.3	1.2
889	261.2	1950 XII. 13.	19 45—20 40	P	25	2	1	—26	4.8	2.5	1.9
890	261.4	1949 XII. 13.	19 05—20 05	Bo	30	4	1	—31	8.0	2.4	3.3
891	261.7	1949 XII. 14.	00 40—01 10	P	30	4	2	+15	8.0	3.6	2.2
892	261.9	1946 XII. 14.	17 35—18 10	Bo	30	1	1	—36	2.0	2.3	0.9
893	262.5	1949 XII. 14.	19 05—20 25	M	90	3	4	—30	2.0	2.4	0.8
894	263.8	1949 XII. 16.	02 00—04 00	P	120	8	8	+32	4.0	4.1	1.0
895	264.2	1946 XII. 16.	17 55—18 30	K	30	2	1	—37	4.0	2.3	1.7
896	264.2	1946 XII. 16.	18 30—19 00	K	30	0	1	—35	0.0	2.3	0.0
897	264.3	1946 XII. 16.	19 00—19 30	K	25	1	1	—33	2.4	2.4	1.0
898	264.3	1946 XII. 16.	20 00—20 30	K	30	2	1	—28	4.0	2.5	1.6
899	264.5	1946 XII. 17.	00 50—01 40	K	50	1	3	+18	1.2	3.7	0.3
900	265.0	1947 XII. 17.	19 20—19 50	K	30	1	1	—32	2.0	2.4	0.8
901	265.0	1951 XII. 17.	18 15—19 45	P	70	3	3	—35	2.6	2.3	1.1
902	265.1	1947 XII. 17.	19 50—20 35	K	40	2	2	—28	3.0	2.5	1.2
903	265.4	1946 XII. 17.	23 30—00 25	K	50	7	3	+ 3	8.4	3.3	2.5
904	265.9	1951 XII. 18.	17 20—18 35	P	50	2	2	—38	2.4	2.3	1.0
905	266.0	1947 XII. 18.	17 40—18 20	M	40	2	2	—38	3.0	2.3	1.3
906	266.2	1947 XII. 17.	00 05—00 40	K	35	2	2	+ 9	3.4	3.4	1.0
907	266.3	1947 XII. 19.	00 45—01 20	K	35	3	2	+15	5.1	3.6	1.4
908	266.5	1946 XII. 19.	00 35—01 30	K	55	5	3	+17	5.5	3.7	1.5
909	266.7	1948 XII. 18.	17 30—18 30	M	60	2	2	—38	2.0	2.3	0.9
910	267.0	1951 XII. 19.	17 35—18 35	K	60	0	2	—38	0.0	2.3	0.0
911	267.4	1946 XII. 19.	20 45—21 30	K	45	2	2	—22	2.7	2.6	1.0
912	267.5	1947 XII. 20.	04 20—06 30	M	100	7	7	+41	4.2	4.3	1.0
913	267.6	1946 XII. 20.	02 15—03 00	K	45	2	3	+28	2.7	4.0	0.7
914	267.6	1946 XII. 20.	03 00—03 30	K	30	3	2	+32	6.0	4.1	1.5
915	267.7	1946 XII. 20.	03 30—04 00	K	20	3	1	+35	9.0	4.2	2.1
916	267.7	1946 XII. 20.	04 00—04 30	K	30	2	2	+38	4.0	4.3	0.9
917	267.8	1946 XII. 20.	05 35—06 10	K	35	2	3	+41	3.4	2.2	1.5
918	267.8	1948 XII. 19.	18 00—18 55	B	55	4	2	—38	4.4	2.3	1.9
919	268.3	1946 XII. 20.	18 00—18 30	K	30	1	1	—38	2.0	2.3	0.9
920	268.3	1946 XII. 20.	18 30—19 00	K	30	2	1	—37	4.0	2.3	1.7
921	268.4	1946 XII. 20.	20 00—20 30	K	30	2	1	—29	4.0	2.5	1.6
922	268.4	1946 XII. 20.	20 30—21 00	K	30	3	1	—25	6.0	2.5	2.4
923	268.4	1946 XII. 20.	21 00—21 40	K	40	1	2	—20	1.5	2.7	0.6

No	⊙	Date	Time M. E. T.	Obs.	τ	n_o	n_c	H	f_o	f_c	F
924	268.5	1949 XII. 20.	18 00—19 30	M	80	5	3	—37	3.8	2.3	1.7
925	268.7	1950 XII. 21.	04 05—05 55	P	90	3	6	+40	2.0	4.3	0.5
926	269.1	1952 XII. 21.	03 15—04 20	P	60	2	4	+35	2.0	4.2	0.5
927	269.5	1946 XII. 21.	23 55—00 30	K	35	2	2	+ 6	3.4	3.4	1.0
928	269.6	1946 XII. 22.	00 30—01 00	K	20	2	1	+11	6.0	3.5	1.7
929	269.6	1946 XII. 22.	01 00—01 40	K	25	2	2	+16	4.8	3.7	1.3
930	269.6	1949 XII. 21.	18 30—21 00	M	120	6	5	—33	3.0	2.4	1.2
931	269.9	1948 XII. 21.	20 40—22 00	M	80	5	4	—21	3.8	2.6	1.5
932	270.2	1951 XII. 22.	21 35—23 50	P	110	7	5	— 9	3.8	2.9	1.3
933	270.5	1946 XII. 22.	21 35—23 00	D	55	4	3	—12	4.4	2.9	1.5
934	270.5	1946 XII. 22.	23 00—00 30	D	48	8	3	+ 1	10.0	3.2	3.1
935	270.6	1946 XII. 23.	00 30—01 30	D	33	5	2	+13	9.1	3.6	2.5
936	273.2	1952 XII. 25.	03 15—04 50	P	85	4	6	+35	2.8	4.2	0.7
937	273.8	1946 XII. 26.	05 05—05 55	B	50	3	4	+39	3.6	4.3	0.8
938	274.2	1947 XII. 26.	19 05—20 22	Be	60	4	2	—35	4.0	2.3	1.7
939	275.1	1949 XII. 27.	04 20—05 00	B	35	2	2	+37	3.4	4.2	0.8
940	275.9	1946 XII. 28.	04 25—05 00	D	30	7	2	+37	14.0	4.2	3.3
941	275.9	1946 XII. 28.	05 00—05 50	D	48	0	3	+38	0.0	4.3	0.0
942	276.0	1948 XII. 27.	20 20—21 20	B	50	4	2	—27	4.8	2.5	1.9
943	276.3	1948 XII. 28.	03 20—05 12	P	85	5	6	+35	3.5	4.2	0.8
944	278.2	1949 XII. 30.	05 30—06 15	B	40	0	3	+37	0.0	4.2	0.0
945	278.6	1951 XII. 31.	02 45—03 45	K	55	2	4	+39	2.2	4.0	0.6
946	280.3	1948 I. 1.	18 00—19 10	F	64	4	2	—43	3.8	2.2	1.7
947	280.5	1951 I. 1.	18 00—19 40	P	85	7	3	—42	4.9	2.2	2.2
948	283.0	1947 I. 4.	05 30—06 30	M	55	4	4	+34	4.4	4.2	1.0
949	283.6	1948 I. 5.	01 30—03 00	M	80	5	5	+20	3.8	3.8	1.0
950	283.7	1952 I. 5.	04 50—05 20	P	20	0	1	+34	0.0	4.2	0.0
951	285.3	1948 I. 6.	17 20—17 55	K	30	1	1	—46	2.0	2.1	1.0
952	285.3	1948 I. 6.	17 55—18 35	K	30	2	1	—45	4.0	2.1	1.9
953	285.4	1948 I. 6.	18 30—19 05	K	35	4	1	—44	6.9	2.2	3.1
954	285.5	1948 I. 6.	22 10—22 40	K	30	1	1	—16	2.0	2.8	0.7
955	285.7	1952 I. 7.	03 20—04 50	P	60	3	4	+31	3.0	4.1	0.7
956	286.3	1949 I. 6.	23 50—01 10	M	60	2	3	+ 4	2.0	3.3	0.6
957	286.6	1947 I. 7.	18 15—19 00	M	45	0	2	—44	0.0	2.2	0.0
958	288.1	1951 I. 9.	04 10—05 30	P	70	7	5	+32	6.0	4.1	1.5
959	288.7	1947 I. 9.	18 20—18 50	M	30	1	1	—45	2.0	2.1	1.0
960	288.7	1951 I. 9.	19 40—21 20	P	45	2	2	—33	2.7	2.4	1.1
961	288.7	1951 I. 9.	19 50—21 15	B	70	4	3	—33	3.4	2.4	1.4
962	288.7	1951 I. 9.	20 00—22 00	L	100	6	4	—30	3.6	2.4	1.5
963	288.8	1948 I. 10.	04 30—05 30	M	60	3	4	+32	3.0	4.1	0.7
964	288.8	1951 I. 9.	22 00—00 00	J	100	2	5	—10	1.2	2.9	0.4
965	288.9	1950 I. 9.	18 00—19 00	M	60	2	2	—45	2.0	2.1	1.0
966	289.0	1951 I. 10.	03 00—04 00	J	40	4	3	+27	6.0	4.0	1.5
967	289.1	1951 I. 10.	04 20—06 05	P	70	5	5	+33	4.3	4.1	1.0
968	289.7	1951 I. 10.	18 00—19 00	J	60	6	2	—46	6.0	2.1	2.9
969	289.7	1951 I. 10.	19 15—20 45	B	78	3	3	—37	2.3	2.3	1.0
970	289.8	1951 I. 10.	20 00—22 30	L	120	8	5	—27	4.0	2.5	1.6
971	289.9	1950 I. 10.	18 00—19 45	M	100	6	4	—45	3.6	2.1	1.7
972	290.0	1950 I. 10.	19 00—20 30	Iv	60	1	2	—40	1.0	2.2	0.5
973	290.6	1948 I. 11.	21 30—22 25	M	40	2	2	—22	3.0	2.6	1.2
974	290.7	1947 I. 11.	18 10—19 00	M	50	1	2	—46	1.2	2.1	0.6
975	291.0	1950 I. 11.	19 15—21 00	Iv	80	2	3	—37	1.5	2.3	0.7
976	293.3	1953 I. 13.	19 05—19 45	K	40	2	1	—42	3.0	2.2	1.4
977	293.3	1953 I. 13.	19 05—19 45	V	40	1	1	—42	1.5	2.2	0.7
978	294.0	1947 I. 15.	00 25—01 10	P	40	1	2	+ 5	1.5	3.3	0.5
979	294.0	1951 I. 14.	23 30—01 30	L	95	5	5	+ 2	3.2	3.2	1.0
980	294.2	1953 I. 14.	18 05—19 25	K	75	5	3	—46	4.0	2.1	1.9
981	294.2	1953 I. 14.	18 05—19 25	V	70	1	2	—46	0.9	2.1	0.4
982	294.3	1953 I. 14.	19 35—20 45	P	70	3	3	—37	2.6	2.3	1.1
983	294.4	1953 I. 14.	23 00—23 40	K	40	1	2	— 8	1.5	3.0	0.5
984	294.4	1953 I. 14.	23 00—23 45	V	40	1	2	— 8	1.5	3.0	0.5
985	294.6	1953 I. 15.	03 05—04 00	K	55	7	4	+25	7.6	3.9	1.9
986	294.6	1953 I. 15.	04 15—04 45	K	30	1	2	+29	2.0	4.0	0.5
987	294.7	1953 I. 15.	04 00—05 45	P	95	4	6	+30	2.5	4.1	0.6
988	295.3	1953 I. 15.	20 10—21 20	P	60	2	2	—34	2.0	2.3	0.9
989	295.4	1953 I. 15.	22 15—23 20	V	50	2	2	—14	2.4	2.8	0.9
990	295.6	1952 I. 16.	20 00—20 50	K	45	2	2	—36	2.7	2.3	1.2
991	295.6	1953 I. 16.	02 10—04 20	P	100	4	6	+24	2.4	3.9	0.6
992	296.2	1947 I. 17.	02 40—03 40	P	30	0	2	+22	0.0	3.8	0.0
993	296.6	1952 I. 17.	18 45—19 20	K	35	1	1	—46	1.7	2.1	0.8
994	297.0	1948 I. 18.	03 50—05 20	M	50	5	3	+28	6.0	4.0	1.5

No	☉	Date	Time M. E. T.	Obs.	τ	n_o	n_c	H	f_o	f_c	F
995	297.2	1949 I. 17.	18 00—19 00	M	60	1	2	—49	1.0	2.1	0.5
996	297.4	1953 I. 17.	20 30—21 30	Ša	50	1	2	—32	1.2	2.4	0.5
997	297.4	1953 I. 17.	21 30—22 25	K	50	2	2	—23	2.4	2.6	0.9
998	298.5	1950 I. 19.	04 00—06 00	M	100	7	7	+29	4.2	4.0	1.0
999	300.4	1949 I. 20.	18 00—19 00	M	40	1	1	—50	1.5	2.1	0.7
1000	300.7	1953 I. 21.	02 20—04 45	V	140	8	9	+23	3.4	3.9	0.9
1001	300.7	1953 I. 21.	02 30—03 55	P	70	8	4	+22	6.9	3.8	1.8
1002	300.8	1953 I. 21.	04 05—05 20	P	80	2	5	+27	1.5	4.0	0.4
1003	301.6	1950 I. 22.	04 30—05 00	M	30	3	2	+27	6.0	4.0	1.5
1004	301.6	1952 I. 22.	17 40—19 15	K	90	1	3	—50	0.7	2.1	0.3
1005	302.0	1952 I. 23.	01 55—03 25	K	85	7	5	+18	4.9	3.7	1.3
1006	303.5	1950 I. 24.	03 00—04 10	M	70	4	5	+23	3.4	3.9	0.9
1007	303.8	1953 I. 24.	03 50—05 05	P	30	2	2	+25	4.0	3.9	1.0
1008	303.9	1949 I. 24.	05 20—06 00	M	40	2	3	+37	3.0	4.2	0.7
1009	304.5	1950 I. 25.	02 00—04 00	M	120	12	7	+19	6.0	3.7	1.6
1010	306.5	1950 I. 27.	02 00—03 00	M	60	3	4	+15	3.0	3.6	0.8
1011	307.2	1947 I. 27.	22 30—23 30	P	55	1	3	—15	1.1	2.8	0.4
1012	307.3	1947 I. 28.	02 45—03 15	M	30	2	2	+18	4.0	3.7	1.1
1013	307.7	1950 I. 28.	04 30—05 30	Iv	60	3	4	+25	3.0	3.9	0.8
1014	307.7	1950 I. 28.	04 30—05 40	M	70	7	5	+25	6.0	3.9	1.5
1015	307.9	1949 I. 28.	04 50—06 00	M	60	6	4	+26	6.0	3.9	1.5
1016	307.9	1952 I. 28.	21 20—23 00	P	75	4	3	—23	3.2	2.6	1.2
1017	308.1	1952 I. 29.	03 15—05 20	P	100	3	6	+24	1.8	3.9	0.5
1018	308.3	1947 I. 29.	00 20—02 00	M	70	6	4	+ 4	5.1	3.3	1.5
1019	308.7	1950 I. 29.	03 30—05 40	M	120	7	8	+25	3.5	3.9	0.9
1020	308.9	1948 I. 29.	20 20—21 05	M	40	0	2	—37	0.0	2.3	0.0
1021	309.0	1949 I. 29.	05 05—06 05	M	60	3	4	+25	3.0	3.9	0.8
1022	309.2	1951 I. 29.	22 30—23 25	P	35	2	2	—16	3.4	2.8	1.2
1023	309.3	1947 I. 30.	00 10—01 25	P	70	2	4	0	1.7	3.2	0.5
1024	309.7	1950 I. 30.	05 00—06 00	M	60	0	4	+25	0.0	3.9	0.0
1025	309.8	1948 I. 30.	18 10—18 45	M	30	0	1	—53	0.0	2.0	0.0
1026	310.0	1949 I. 30.	04 50—06 00	M	60	4	4	+25	4.0	3.9	1.0
1027	311.5	1947 II. 1.	04 00—06 00	M	110	7	7	+25	3.8	3.9	1.0
1028	312.1	1951 II. 1.	18 55—20 05	B	55	0	2	—47	0.0	2.1	0.0
1029	312.3	1951 II. 2.	01 00—02 00	L	50	2	3	+ 5	2.4	3.3	0.7
1030	312.9	1948 II. 2.	18 40—20 50	P	100	2	4	—46	1.2	2.1	0.6
1031	312.9	1948 II. 2.	19 00—20 30	B	75	3	3	—46	2.4	2.1	1.1
1032	313.0	1948 II. 2.	22 10—23 10	M	40	1	2	—20	1.5	2.7	0.6
1033	313.1	1951 II. 2.	18 15—19 10	P	40	0	1	—53	0.0	2.0	0.0
1034	314.0	1949 II. 3.	04 00—06 00	M	100	2	6	+24	1.2	3.9	0.3
1035	314.1	1951 II. 3.	19 40—21 05	P	80	2	3	—41	1.5	2.2	0.7
1036	314.2	1951 II. 3.	22 03—23 10	P	50	1	2	—21	1.2	2.6	0.5
1037	315.4	1951 II. 5.	01 00—02 00	J	60	2	3	+ 5	2.0	3.3	0.6
1038	315.9	1949 II. 5.	02 00—03 00	M	40	2	2	+12	3.0	3.5	0.9
1039	318.7	1953 II. 7.	19 50—20 30	K	30	1	1	—44	2.0	2.2	0.9
1040	318.8	1953 II. 7.	22 40—23 15	V	30	2	1	—19	4.0	2.7	1.5
1041	319.1	1949 II. 8.	03 40—05 40	M	100	3	6	+21	1.8	3.8	0.5
1042	319.2	1951 II. 8.	20 35—21 48	B	60	3	2	—35	3.0	2.3	1.3
1043	319.3	1951 II. 8.	22 00—23 30	L	70	3	3	—21	2.6	2.6	1.0
1044	319.6	1950 II. 8.	18 15—19 30	B	55	3	2	—54	3.3	2.0	1.6
1045	320.3	1951 II. 9.	21 00—23 00	J	100	7	4	—28	4.2	2.5	1.7
1046	320.3	1951 II. 9.	22 00—23 30	L	70	0	3	—21	0.0	2.6	0.0
1047	320.5	1951 II. 10.	03 00—05 00	J	110	3	7	+20	1.6	3.8	0.4
1048	320.8	1953 II. 9.	20 35—21 45	K	45	2	2	—35	2.7	2.3	1.2
1049	320.8	1953 II. 9.	21 30—22 00	V	25	0	1	—30	0.0	2.4	0.0
1050	321.2	1948 II. 11.	00 00—01 00	F	55	2	3	+ 4	2.2	3.0	0.7
1051	321.5	1950 II. 10.	21 25—21 55	M	30	1	1	—31	2.0	2.4	0.8
1052	321.5	1950 II. 10.	21 30—22 00	Iv	30	0	1	—31	0.0	2.4	0.0
1053	321.5	1951 II. 11.	03 00—03 45	L	30	2	2	+15	4.0	3.6	1.1
1054	322.3	1948 II. 12.	01 50—03 10	P	72	1	4	+11	0.9	3.5	0.3
1055	323.0	1948 II. 12.	19 48—21 13	P	80	2	3	—42	1.5	2.2	0.7
1056	323.9	1950 II. 13.	04 50—05 50	M	50	3	3	+21	3.6	3.8	0.9
1057	325.1	1948 II. 14.	19 45—21 40	P	104	2	4	—41	1.2	2.2	0.5
1058	325.1	1953 II. 14.	05 00—05 45	V	40	0	3	+21	0.0	3.8	0.0
1059	325.7	1953 II. 14.	18 40—19 15	K	25	1	1	—55	2.4	2.0	1.2
1060	326.1	1953 II. 15.	03 40—05 20	K	60	1	4	+20	1.0	3.8	0.3
1061	327.3	1947 II. 16.	18 30—19 30	M	60	2	2	—56	2.0	2.0	1.0
1062	328.3	1947 II. 17.	18 20—19 40	M	80	8	3	—56	6.0	2.0	3.0
1063	328.4	1947 II. 17.	21 05—21 55	P	45	1	2	—51	1.3	2.0	0.6
1064	328.6	1950 II. 17.	19 30—20 55	M	70	5	2	—46	4.3	2.1	2.0
1065	328.6	1950 II. 17.	19 45—22 15	Iv	120	6	5	—39	3.0	2.2	1.4

No	⊙	Date	Time M. E. T.	Obs.	τ	n_o	n_c	H	f_o	f_c	F
1066	328.9	1950 II. 18.	04 30—05 30	M	60	3	4	+20	3.0	3.8	0.8
1067	329.6	1950 II. 18.	19 30—22 00	Iv	120	3	4	—41	1.5	2.2	0.7
1068	329.6	1950 II. 18.	20 30—22 00	B	60	5	2	—39	5.0	2.2	2.3
1069	329.8	1950 II. 19.	01 30—03 30	M	120	12	7	+10	6.0	3.5	1.7
1070	330.6	1950 II. 19.	19 15—21 10	Iv	110	4	4	—46	2.2	2.1	1.0
1071	330.9	1950 II. 20.	03 00—05 00	M	100	4	6	+16	2.4	3.7	0.6
1072	331.2	1952 II. 20.	23 05—23 45	K	40	1	2	—20	1.5	2.7	0.6
1073	332.5	1947 II. 21.	22 12—22 52	P	40	2	2	—25	3.0	2.5	1.2
1074	334.8	1950 II. 24.	00 20—02 00	M	100	5	5	— 2	3.0	3.1	1.0
1075	335.9	1950 II. 25.	03 00—05 05	M	100	9	6	+15	5.4	3.6	1.5
1076	337.1	1948 II. 26.	19 10—19 50	F	40	1	1	—53	1.5	2.0	0.8
1077	337.6	1947 II. 27.	00 00—00 35	P	35	1	2	—10	1.7	2.9	0.6
1078	337.7	1947 II. 27.	03 00—05 00	P	120	6	7	+15	3.0	3.6	0.8
1079	339.0	1950 II. 28.	04 00—05 00	M	50	3	3	+16	3.6	3.7	1.0
1080	339.2	1948 II. 28.	19 35—21 00	B	75	6	3	—47	4.8	2.1	2.3
1081	339.2	1948 II. 28.	21 30—22 00	F	30	0	1	—35	0.0	2.3	0.0
1082	340.2	1948 II. 29.	21 00—21 30	B	25	2	1	—39	4.8	2.2	2.2
1083	340.2	1948 II. 29.	21 15—23 10	P	90	0	4	—30	0.0	2.4	0.0
1084	340.2	1949 III. 1.	03 20—04 50	M	50	3	3	+15	3.6	3.6	1.0
1085	341.1	1948 III. 1.	19 30—20 45	M	70	1	2	—49	0.9	2.1	0.4
1086	341.3	1948 III. 1.	23 25—00 15	F	50	2	2	—15	2.4	2.8	0.9
1087	341.3	1948 III. 1.	23 37—00 42	P	60	3	3	—11	3.0	2.9	1.0
1088	341.3	1949 III. 2.	04 00—05 20	M	80	6	5	+16	4.5	3.7	1.2
1089	341.7	1947 III. 3.	03 20—05 00	M	90	3	5	+15	2.0	3.6	0.6
1090	341.8	1953 III. 2.	18 55—19 40	K	40	0	1	—56	0.0	2.0	0.0
1091	341.8	1953 III. 2.	19 00—19 40	V	30	1	1	—55	2.0	2.0	1.0
1092	342.2	1948 III. 2.	22 00—23 00	F	55	2	2	—27	2.2	2.5	0.9
1093	342.3	1948 III. 2.	22 32—00 15	P	100	2	4	—19	1.2	2.7	0.4
1094	343.2	1948 III. 3.	21 45—22 45	F	55	1	2	—30	1.1	2.4	0.5
1095	343.4	1948 III. 4.	01 00—02 30	P	80	2	4	+ 1	1.5	3.2	0.5
1096	343.4	1948 III. 4.	02 20—03 40	M	15	0	1	+10	0.0	3.5	0.0
1097	344.3	1948 III. 4.	22 20—23 30	F	70	2	3	—24	1.7	2.6	0.7
1098	344.4	1948 III. 5.	01 05—02 20	P	70	1	4	0	0.9	3.2	0.3
1099	345.4	1948 III. 6.	02 10—03 00	M	40	3	2	+ 7	4.5	3.4	1.3
1100	345.5	1948 III. 6.	03 10—05 00	P	70	2	4	+15	1.7	3.6	0.5
1101	346.0	1953 III. 6.	21 55—23 30	K	80	3	3	—26	2.2	2.5	0.9
1102	346.3	1948 III. 6.	22 10—00 20	F	130	6	6	—20	2.8	2.7	1.0
1103	346.6	1950 III. 7.	19 00—21 10	M	120	2	4	—50	1.0	2.1	0.5
1104	347.1	1949 III. 8.	00 20—02 00	M	60	2	3	— 6	2.0	3.0	0.7
1105	347.3	1948 III. 7.	23 20—23 50	P	30	0	1	—18	0.0	2.7	0.0
1106	348.4	1947 III. 9.	18 50—20 50	M	100	5	3	—52	3.0	2.0	1.5
1107	348.6	1950 III. 9.	19 40—20 20	M	40	2	1	—51	3.0	2.0	1.5
1108	348.8	1950 III. 9.	21 55—22 40	B	40	2	2	—30	3.0	2.4	1.2
1109	349.4	1947 III. 10.	18 40—19 30	M	45	1	1	—57	1.3	2.0	0.6
1110	349.4	1947 III. 10.	19 50—20 30	B	40	2	1	—50	3.0	2.1	1.4
1111	349.5	1947 III. 10.	22 10—22 43	P	33	0	1	—29	0.0	2.5	0.0
1112	350.2	1949 III. 11.	03 30—05 00	M	90	2	5	+15	1.3	3.6	0.4
1113	351.6	1947 III. 12.	23 20—00 20	M	55	1	3	—16	1.1	2.8	0.4
1114	352.3	1948 III. 12.	22 10—23 45	F	80	4	3	—25	3.0	2.5	1.2
1115	352.9	1953 III. 13.	20 20—21 15	V	50	2	2	—45	2.4	2.1	1.1
1116	354.1	1953 III. 15.	01 30—02 00	K	30	2	2	0	4.0	3.2	1.2
1117	354.2	1953 III. 15.	03 05—04 15	K	50	2	3	+12	2.4	3.5	0.7
1118	354.7	1951 III. 16.	03 20—05 00	P	70	2	4	+14	1.7	3.6	0.5
1119	355.6	1951 III. 17.	02 30—03 10	P	30	1	2	+ 7	2.0	3.4	0.6
1120	355.7	1951 III. 17.	03 00—04 30	J	80	2	5	+12	1.5	3.5	0.4
1121	356.9	1950 III. 18.	03 45—04 25	M	40	2	2	+13	3.0	3.6	0.8
1122	357.9	1950 III. 19.	03 00—04 00	M	60	3	4	+11	3.0	3.5	0.9
1123	359.4	1947 III. 20.	19 40—20 30	M	45	2	2	—51	2.7	2.0	1.4
1124	359.6	1950 III. 20.	20 35—21 20	B	45	0	2	—44	0.0	2.2	0.0
1125	359.9	1949 III. 20.	20 10—21 10	B	55	3	2	—46	3.3	2.1	1.6
1126	359.9	1949 III. 20.	20 10—21 10	Be	55	3	2	—46	3.3	2.1	1.6

4. *The Dependence between the Hourly Rates and the Altitude of the Apex*

For the purpose of establishing the dependence of the hourly rate upon the position of the apex, the observations of Table II have been distributed into twelve groups according to the apex's altitude. The result of this distribution is shown in Table III. The first column indicates the range in the altitude of the apex H, the second the total net time in minutes τ, the third the total number of meteors n and the fourth the derived hourly rate $f_o = 60\, n/\tau$. The course of the hourly rates with the changing position of the apex has been compared with the theoretical dependence computed by Hoffmeister on the base of his theory [2]. It was found that the Hoffmeister's curve for $c = 4$ fits very well to the present observations, except for the highest altitudes $+40°$ to $+60°$, where an excess takes place. The expected hourly rates obtained by multiplying Hoffmeister's values by a constant (chosen so as to make them conformable with those deduced from the present observations) are given in the fifth column and the differences $f_o - f_c$ in the sixth column of the Table.

Table III

H	τ	n	f_o	f_c	$O—C$
—60—50	1 195	42	2.11	2.08	+0.03
50—40	3 836	142	2.22	2.23	—0.01
40—30	4 428	183	2.48	2.42	+0.06
30—20	5 313	232	2.62	2.63	—0.01
20—10	4 939	248	3.01	2.88	+0.13
—10— 0	7 758	415	3.21	3.15	+0.06
+ 0—10	11 870	650	3.29	3.43	—0.14
10—20	6 151	364	3.55	3.73	—0.18
20—30	5 612	371	3.97	4.02	—0.05
30—40	3 953	288	4.38	4.29	+0.09
40—50	4 090	363	5.33	4.54	+0.79
+50—60	4 691	411	5.26	4.77	+0.49

It is not attempted to take this result for an evidence of high hyperbolic velocities of telescopic meteors. In fact, there are several factors which do not allow to ascribe to the numerical value of c any direct interpretation. In spite of that, the effective value of c may be taken for a measure of the apparent concentration of radiants to the apex and used for eliminating the influence of this concentration from the observations. It may be noted that the effective value of c is about three times as high as the real one which can be reasonably expected.

Before deducing a more accurate value of c, the possible contribution of meteor showers must be taken into consideration. In spite of the fact that the collected data are right extensive, we may not expect that the variations of f_o executed by the meteor showers will be equal for all groups of H. The disturbing effect of meteor showers can be, by no means, entirely avoided; however, it can be made much less significant by the following procedure.

Let us suppose that the corrections to be applied to f_c/f_o are such small that the value $c = 4$ may be taken for the first approximation. Then the a priori probability $P(n, H)$ that during a single observation of a net time τ, at the apex's altitude H, just n meteors will appear, may be approximated according to the Poisson formula by:

$$P(n, H) = \frac{e^{-i}\, i^n}{n!} \qquad (1)$$

and the a priori probability $P'(n, H)$ that n or more meteors will appear by:

$$P'(n, H) = \sum_{m=n}^{m=\infty} \frac{e^{-i}\, i^m}{m!} \qquad (2)$$

where:

$$i = \frac{1}{60}\tau f_c(H) \qquad (3)$$

Now if we choose a proper limiting value C we may pick out those observations for which the meteor numbers are so high that

$$P'(n, H) < C \qquad (4)$$

and omit them as most suspicious of indicating a shower activity. We have put $C = 0.01$ and derived by the solution of (2)—(3) the dependence between τ and H for different n. This dependence is graphically represented in Figure 2 which can be directly employed for finding out the observations with $P'(n, H) < 0.01$. We fix the point whose ordinate equals to τ and abscissa to H of the given observation. Then $P'(n, H) > 0.01$ if the point is situated to the left and below of the curve for the observed n, and $P'(n, H) < 0.01$ if the point is situated to the right and above it. In this way 22 observations have been found out for which $P'(n, H) < 0.01$.

On the base of the Law of Chance we could expect that about 11 observations (i. e. one half of the actual number) would fall into this group if no showers were present. However, we must remember that the elimination of the 22 observations would make the average hourly rates some-

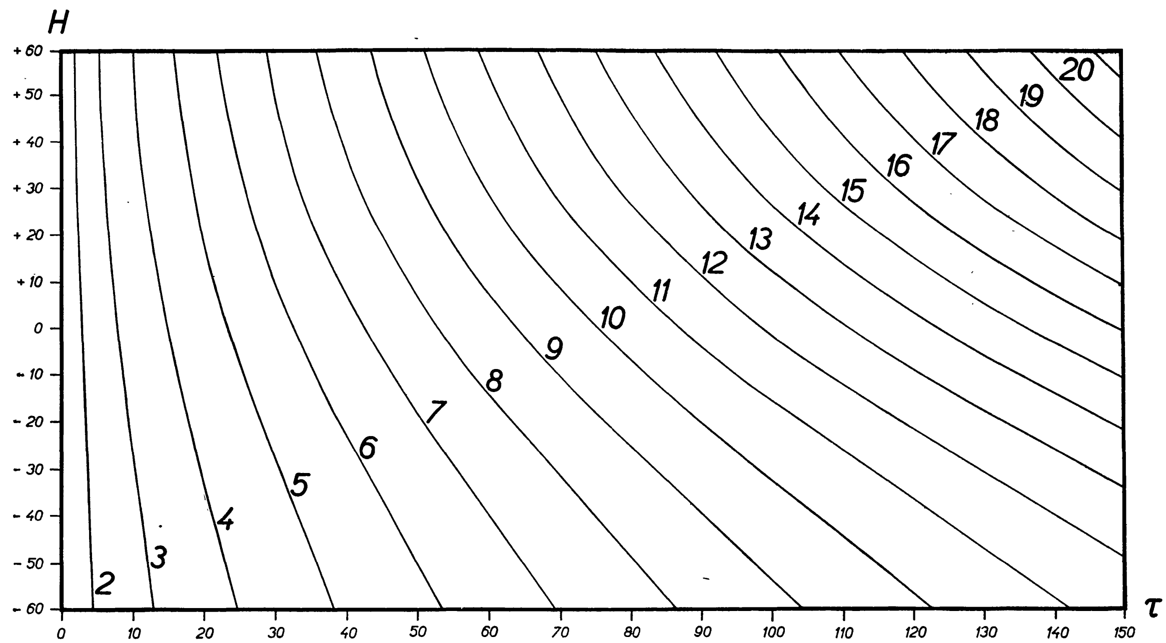

Figure 2.

what lower and the repeated computation with new values of f_c would consequently lead to a somewhat larger number of cases when $P'(n, H) < 0.01$. Hence we may conclude that the adaption of $C = 0.01$ is convenient, eliminating all cases of an evident shower activity and but few cases uhere the abnormal enhancement was due to sporadic meteors.

Table IV

H	τ	w	n	f_o	f_c	$O-C$	ε
—60—50	1 115	2	34	1.83	1.99	—0.16	0.31
50—40	3 836	6	142	2.22	2.14	+0.08	0.19
40—30	4 428	7	183	2.48	2.32	+0.16	0.18
30—20	5 283	8	227	2.58	2.54	+0.04	0.17
20—10	4 909	8	242	2.96	2.78	+0.18	0.19
—10— 0	7 568	12	386	3.06	3.05	+0.01	0.16
+ 0—10	11 697	19	622	3.19	3.33	—0.14	0.13
10 20	6 046	10	348	3.45	3.62	—0.17	0.18
20—30	5 392	9	335	3.73	3.92	—0.19	0.20
30—40	3 713	6	247	3.99	4.19	—0.20	0.25
40—50	3 718	6	275	4.44	4.45	—0.01	0.27
+50—60	4 601	7	395	5.15	4.66	+0.49	0.26

Table IV gives the modification of the Table III obtained by leaving out the above mentioned 22 observations. In comparison with Table III two additional columns are included. The third column indicates the weights of the individual groups, for which the percentages of the total net time due to the observations of the respective group have been adopted. The last column gives the natural uncertainties ε of f_o according to the approximate formula

$$\varepsilon = \frac{f_o}{\sqrt{n}} \tag{5}$$

The definitive values of f_c have been computed by applying the method of least squares on the results of Table IV. The solution for c gave the result

$$c = 3.9 \tag{6}$$

and for the hourly rate $f_c(0)$ corresponding to $H = 0°$

$$f_c(0) = 3.19 \tag{7}$$

We see that the resulting difference between the observation and computation is high only for $H = +50°$ to $+60°$; otherwise the fit is very close. The dependence between f_o, f_c and H is graphically represented in Figure 3.

Table V

H	f_c	H	f_c	H	f_c
—60	1.93	—20	2.66	+25	3.92
55	1.99	15	2.78	30	4.06
50	2.06	10	2.91	35	4.19
45	2.14	—5	3.05	40	4.32
40	2.23	0	3.19	45	4.45
35	2.32	+5	3.33	50	4.56
30	2.43	10	3.48	55	4.66
—25	2.54	15	3.62	+60	4.76
		+20	3.78		

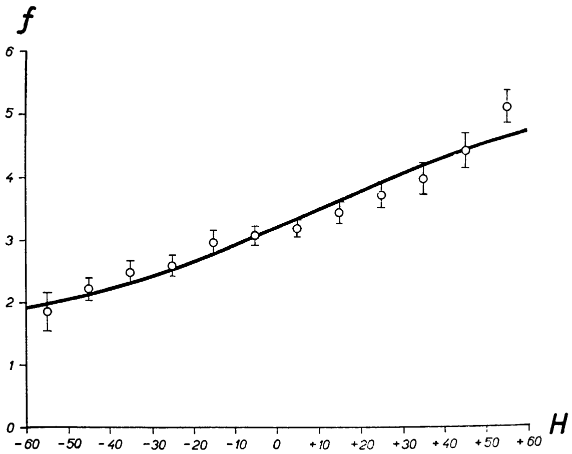

Figure 3.

Comparing the obtained value of c with those derived previously by Hoffmeister from the visual observations we see that it is considerably higher. There are two possible explanations of this fact:

1. either a systematic selection in favour of slower meteors decreases the amplitude of variation of hourly rates,
2. or the direct orbits are prevailing more among telescopic meteors than among the naked-eye ones.

5. The Irregularities in the Changes of Hourly Rates

To follow the irregularities in the changes of hourly rates we may eliminate the effect of the

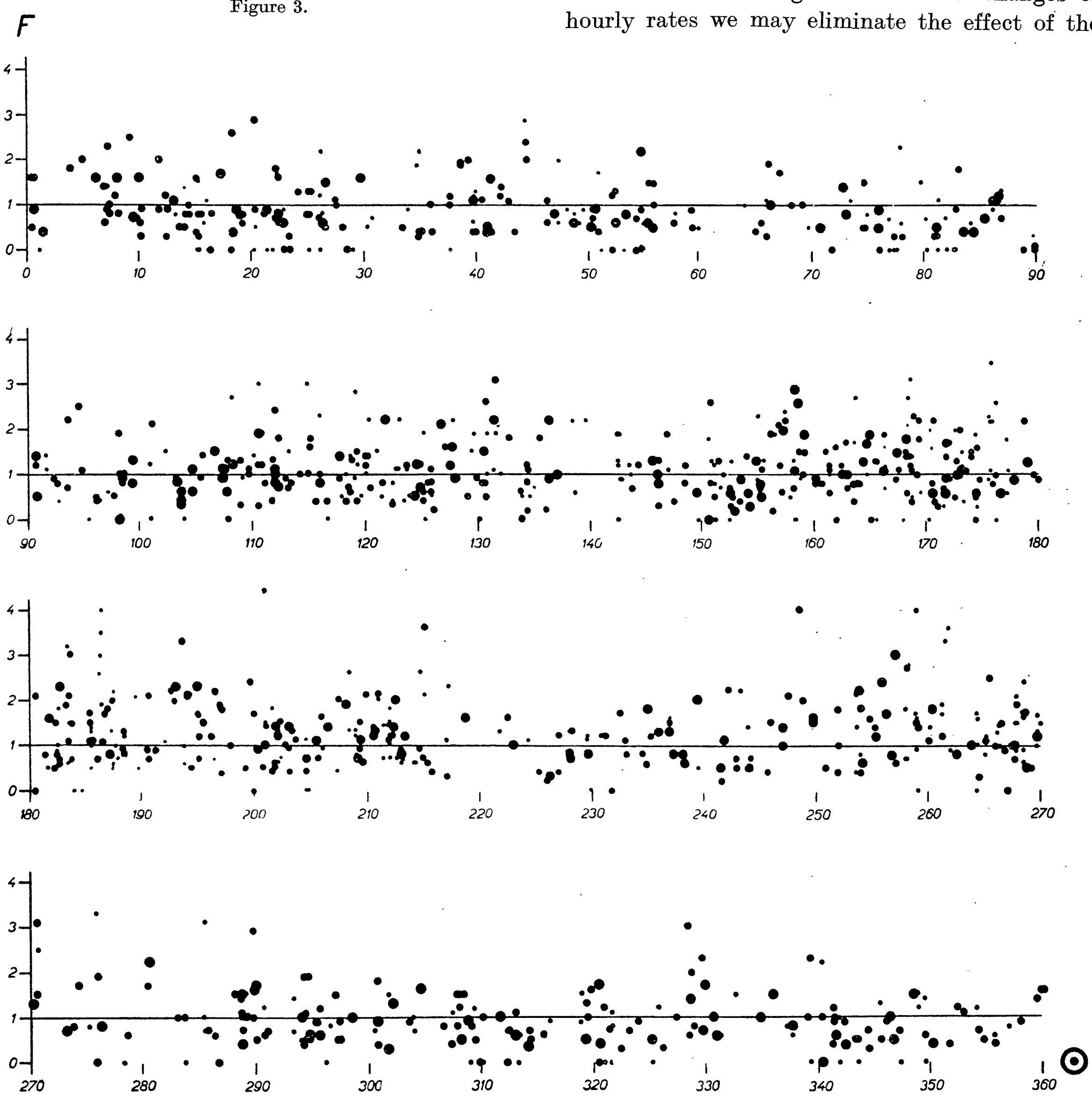

Figure 4.

apex's altitude by introducing a reduced hourly rate F defined by

$$F = \frac{f_o}{f_c} \qquad (8)$$

where the value of f_c is given by the conditions (6)—(7). The values of f_c for different H are tabulated on p. 60 for the individual observations they are given in the last two columns of Table II together with the reduced hourly rates F. In Figure 4 these individual values of F are plotted against the longitude of the Sun ⊙.

To investigate the irregularities in the yearly variation, the observations have been distributed into 72 groups, each covering 5° in the Sun's longitude. The results are shown in the Table VI and in the upper part of the Figure 5 where the solid curve joins the smoothed values of F, computed according to the formula

$$F_s(\odot) = \frac{1}{4}\,[F(\odot - 5^\circ) + 2F(\odot) + F(\odot + 5^\circ)] \qquad (9)$$

The meaning of the quantities given in Table VI is as follows: 1. the range in the Sun's longitude ⊙, 2. the number of included observations o, 3. the total net time in minutes $\Sigma\tau$, 4. the total number of recorded meteors Σn, 5. the mean reduced hourly rate $F = \Sigma\tau\,\frac{f_o}{f_c}\,/\Sigma\tau$, 6. the natural uncertainty $\varepsilon = F/\sqrt{\Sigma n}$, 7. the smoothed mean reduced hourly rate F_s [see (9)]. The upper part of Figure 5 must reveal the presence of meteor showers, if active, especially those of permanent streams. In fact, there are some places where the curve is sensibly elevated above the average level, such as near $\odot = 190°$ or $\odot = 250°$. However, still another interesting feature is seen on the Figure. Although the influence of the apex's altitude has been eliminated, the yearly variation did not entirely disappear. The general course of the variation is shown in the lower part of the diagram where the range in ⊙ has been extended to 30°. The smoothed curve of F_s does not differ too much from a sinusoid (represented by the dashed line) with the maximum at $\odot = 218°$ and minimum at $\odot = 38°$; the ratio of the reduced hourly rates at minimum and maximum activity is almost exactly 2 : 3. The values used for the construction of this curve are quoted in Table VII.

It must be emphasized that the curve shows a marked resemblance, even in individual details, to that derived by Hoffmeister from the visual observations of Schmitt, Heybrock and his own [3].

Table VI

⊙	o	$\Sigma\tau$	Σn	F	ε	F_s
0—5	8	545	31	1.15	0.21	1.11
5—10	14	960	52	1.22	0.17	1.14
10—15	18	1195	51	0.96	0.13	0.99
15—20	21	1303	51	0.84	0.12	0.86
20—25	24	1415	51	0.81	0.11	0.84
25—30	18	1007	41	0.92	0.14	0.87
30—35	8	355	13	0.82	0.23	0.89
35—40	15	773	35	1.01	0.17	0.98
40—45	13	890	43	1.08	0.16	0.99
45—50	10	555	21	0.81	0.18	0.86
50—55	21	1255	41	0.76	0.12	0.78
55—60	11	665	27	0.81	0.16	0.76
60—65	2	90	3	0.67	0.38	0.79
65—70	9	542	28	1.00	0.19	0.86
70—75	9	665	26	0.78	0.15	0.78
75—80	13	655	18	0.54	0.13	0.60
80—85	16	883	24	0.54	0.11	0.59
85—90	10	745	29	0.73	0.14	0.78
90—95	12	695	43	1.14	0.17	0.94
95—100	15	960	38	0.73	0.12	0.83
100—105	12	975	39	0.73	0.12	0.80
105—110	18	1438	82	1.01	0.11	0.99
110—115	25	1580	111	1.20	0.11	1.13
115—120	26	1388	92	1.09	0.11	1.09
120—125	22	1190	67	0.97	0.12	1.02
125—130	22	1383	82	1.07	0.12	1.08
130—135	23	1243	95	1.22	0.13	1.20
135—140	8	475	36	1.28	0.21	1.22
140—145	11	420	29	1.09	0.20	1.10
145—150	12	895	55	0.95	0.13	0.94
150—155	29	1707	82	0.78	0.09	0.98
155—160	29	1978	170	1.38	0.11	1.17
160—165	29	1851	130	1.14	0.10	1.25
165—170	30	1560	134	1.33	0.11	1.20
170—175	37	2188	141	1.00	0.08	1.14
175—180	19	993	75	1.23	0.14	1.20
180—185	25	1356	117	1.32	0.12	1.31
185—190	33	1488	132	1.36	0.12	1.40
190—195	16	968	84	1.56	0.17	1.41
195—200	15	800	49	1.16	0.17	1.23
200—205	28	1520	89	1.03	0.11	1.13
205—210	19	1219	97	1.29	0.13	1.20
210—215	30	1635	125	1.20	0.11	1.26
215—220	8	470	38	1.34	0.22	1.28
220—225	4	245	20	1.23	0.28	1.12
225—230	14	839	33	0.70	0.12	0.93
230—235	10	600	36	1.09	0,18	1.00
235—240	11	792	56	1.14	0.15	1.05
240—245	10	710	33	0.83	0.14	1.12
245—250	9	710	76	1.67	0.19	1.36
250—255	14	807	52	1.25	0.17	1.45
255—260	18	1050	103	1.62	0.16	1.46
260—265	16	730	49	1.33	0.19	1.36
265—270	32	1555	90	1.20	0.12	1.30
270—275	7	441	35	1.49	0.25	1.28
275—280	7	343	20	0.94	0.21	1.20
280—285	5	304	20	1.42	0.32	1.26
285—290	21	1293	72	1.25	0.15	1.21
290—295	16	920	38	0.90	0.15	0.97
295—300	11	630	27	0.82	0.16	0.89
300—305	11	795	50	1.02	0.14	0.92
305—310	16	995	49	0.83	0.14	0.83
310—315	11	760	24	0.63	0.13	0.76
315—320	8	445	19	0.97	0.22	0.82
320—325	12	697	23	0.70	0.15	0.90
325—330	13	964	49	1.25	0.18	1.02
330—335	5	390	16	0.88	0.22	1.04
335—340	7	450	26	1.16	0.23	0.96
340—345	17	1030	31	0.63	0.11	0.82
345—350	13	828	30	0.88	0.16	0.78
350—355	7	425	15	0.74	0.19	0.82
355—360	8	410	16	0.91	0.23	0.93

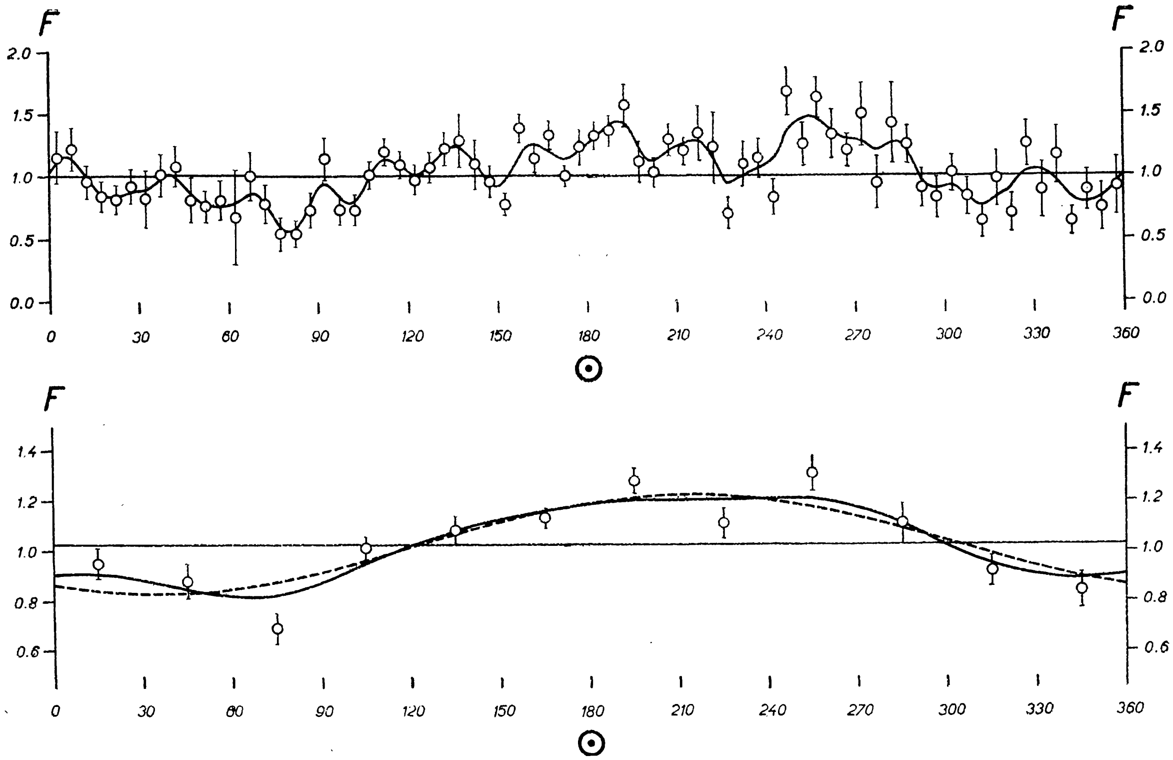

Figure 5.

Table VII

⊙	o	$\Sigma\tau$	Σn	F	ε	F_s
0— 30	103	6 425	277	0.95	0.06	0.91
30— 60	78	4 493	180	0.88	0.07	0.85
60— 90	59	3 580	128	0.69	0.06	0.82
90—120	108	7 036	405	1.01	0.05	0.95
120—150	98	5 606	364	1.08	0.06	1.08
150—180	173	10 277	732	1.14	0.04	1.16
180—210	136	7 351	568	1.28	0.05	1.20
210—240	77	4 581	308	1.10	0.06	1.20
240—270	99	5 562	403	1.31	0.07	1.21
270—300	67	3 931	212	1.11	0.08	1.11
300—330	71	4 656	214	0.91	0.06	0.94
330—360	57	3 533	134	0.84	0.07	0.89

The comparison of the two curves is shown in Figure 6, which demonstrates that neither the smoothing of the curve nor the fitting of the sinusoid is wholly justified, and that at least some fine irregularities in the periodic course of yearly variation are real. The combination of telescopic and visual observations indicates the following common characteristics of the yearly variations:

There exists a double minimum of activity, the first near ⊙ = 330° (in the second half of February) and the second near ⊙ = 70° (at the end of May or at the beginning of June). After the latter minimum the activity rapidly increases till the half of July (⊙ = 110°) and remains on a constant level till the first half of November (⊙ = 230°). Thereafter another increase of activity takes place, terminated with the year's maximum in the middle of December (near ⊙ = 260°, coinciding in date with the period of activity of the Geminid meteor stream) and followed by a gradual decrease to the first minimum in February. Only one substantial difference is seen in the course of naked - eye and telescopic activity, namely a secondary telescopic maximum near ⊙ = 190°, i. e. at the and of September or at the beginning of October. This maximum, suspicious of the occurence of some meteor shower consisting of faint meteors only, will be treated in detail in the 7th paragraph.

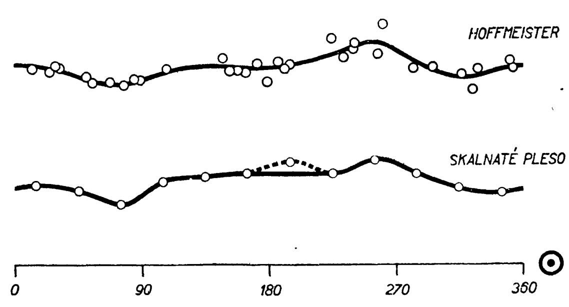

Figure 6.

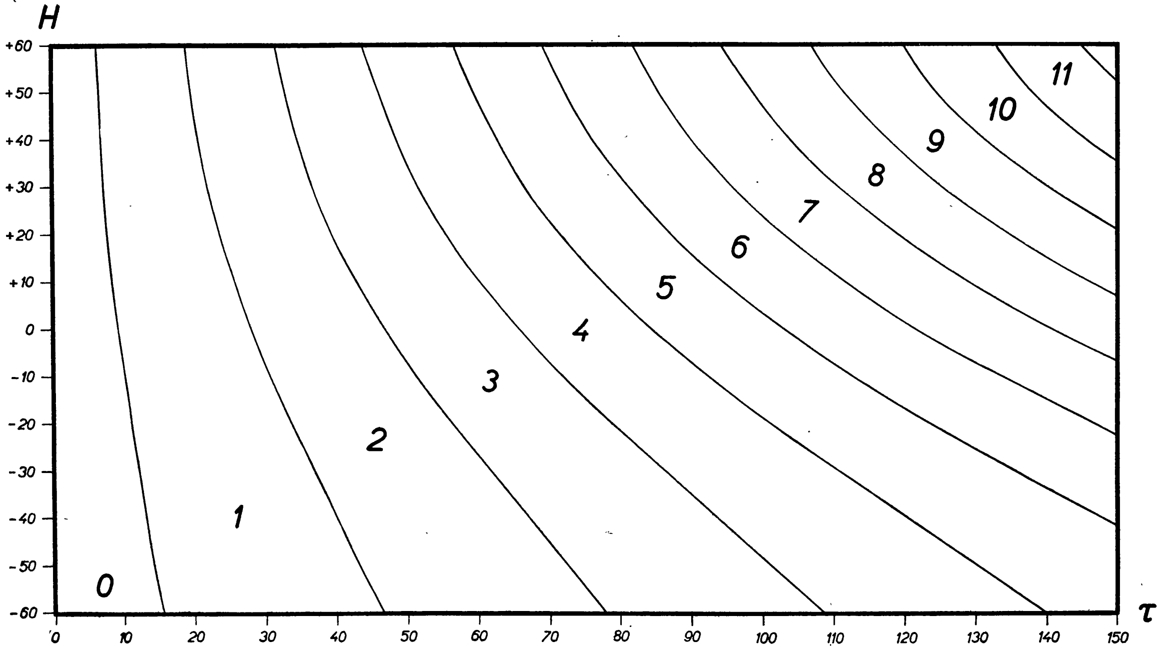

Figure 7.

It must be noted that the described course of yearly variation relates only to the night time activity at the northern hemisphere (geographical latitude of the observatory $\varphi = +49.2°$). However, the striking similarity of the results derived from visual and telescopic observations confirms the opinion that there is no essential difference between the arrangement of telescopic meteor orbits and that one of naked-eye meteors.

6. *On the Presence of Meteor Showers — Collective Treatment*

A statistical estimate of the shower activity in the range of telescopic meteors may be obtained by comparing the observed distribution of meteor rates with the distribution function derived from the Law of Chance. For this purpose we have fixed the expected meteor numbers n_c for each observation according to the formula:

$$n'_c = \frac{\tau f_c}{60} \qquad (10)$$

and rounded up the values of n'_c to the nearest integer number n_c. To facilitate the procedure, an auxiliary diagram shown in Figure 7 has been designed, which enables the values n_c to be directly read off according to τ (ordinate) and H (abscissa). The Figure may also serve for a quick orientation, what number of sporadic meteors is expected to appear when an observation enduring τ minutes at the mean apex's altitude H is carried out with the mentioned instrument (cf. page 41).

All observations have been distributed into ten groups according to n_c ($n_c = 1, 2, \ldots, 10$), and in each group the numbers of observations with different values of n_o have been determined. The observed distribution of N_o has been compared with the expected distribution of N_c following from the Poisson Law:

$$N_c(n_o) = \frac{n_c^{\,n_o} \sum N_o}{e^{n_c}\, n_o!} \qquad (11)$$

Considering the difference between n_c and n'_c the formula (11) has to be integrated within the intervals $\langle n_c - 0.5,\ n_c + 0.5 \rangle$. It was done approximately by inserting:

$$N_c(n_o) = \frac{\Sigma N_o}{4 n_o!} \left[\frac{(n_c - 0.5)^{n_o}}{e^{n_c - 0,5}} + \frac{2 n_c^{\,n_o}}{e^{n_c}} + \frac{(n_c + 0.5)^{n_o}}{e^{n_c + 0,5}} \right] \qquad (12)$$

The results of the computation are given in Table VIII. By summing the values N_o and N_c for different n_o we obtain the Table IX; the quantities $\sqrt{N_c}$, given in the last column, measure the natural uncertainty of each entry. The results of Table IX are graphically represented in Figure 8.

Table VIII

$n_c = 1$

n_o	N_o	N_c	$N_o - N_c$	$\sqrt{N_c}$
0	31	45.0	—14.0	6.7
1	40	39.5	+ 0.5	6.3
2	26	20.0	+ 6.0	4.5
3	11	7.5	+ 3.5	2.7
4	4	2.3	+ 1.7	1.5
5	2	0.6	+ 1.4	0.8
6	1	0.1	+ 0.9	0.4
7	0	0.0	0.0	0.2
8	0	0.0	0.0	0.1

$n_c = 2$

n_o	N_o	N_c	$N_o - N_c$	$\sqrt{N_c}$
0	38	52.0	—14.0	7.2
1	92	97.6	— 5.6	9.9
2	109	94.7	+14.3	9.7
3	59	63.2	— 4.2	8.0
4	34	32.6	+ 1.4	5.7
5	16	13.8	+ 2.2	3.7
6	6	5.0	+ 1.0	2.2
7	3	1.6	+ 1.4	1.3
8	4	0.4	+ 3.6	0.7
9	0	0.1	— 0.1	0.3
10	0	0.0	0.0	0.2
11	0	0.0	0.0	0.1

$n_c = 3$

n_o	N_o	N_c	$N_o - N_c$	$\sqrt{N_c}$
0	20	13.1	+ 6.9	3.6
1	35	37.6	— 2.6	6.1
2	65	54.9	+10.1	7.4
3	44	54.2	—10.2	7.4
4	34	40.7	— 6.7	6.4
5	22	24.7	— 2.7	5.0
6	16	12.7	+ 3.3	3.6
7	5	5.7	— 0.7	2.4
8	3	2.2	+ 0.8	1.5
9	3	0.8	+ 2.2	0.9
10	0	0.2	— 0.2	0.5
11	0	0.1	— 0.1	0.3
12	0	0.0	0.0	0.1
13	0	0.0	0.0	0.1

$n_c = 4$

n_o	N_o	N_c	$N_o - N_c$	$\sqrt{N_c}$
0	5	2.9	+ 2.1	1.7
1	13	11.4	+ 1.6	3.4
2	29	22.3	+ 6.7	4.7
3	30	29.3	+ 0.7	5.4
4	28	29.0	— 1.0	5.4
5	11	23.2	—12.2	4.8
6	16	15.6	+ 0.4	4.0
7	6	9.1	— 3.1	3.0
8	9	4.6	+ 4.4	2.1
9	3	2.1	+ 0.9	1.5
10	0	0.9	— 0.9	0.9
11	0	0.3	— 0.3	0.6
12	1	0.1	+ 0.9	0.3
13	0	0.1	— 0.1	0.2
14	0	0.0	0.0	0.1

$n_c = 5$

n_o	N_o	N_c	$N_o - N_c$	$\sqrt{N_c}$
0	1	0.8	+0.2	0.9
1	5	3.7	+1.3	1.9
2	12	9.1	+2.9	3.0
3	14	14.9	—0.9	3.9
4	18	18.5	—0.5	4.3
5	11	18.4	—7.4	4.3
6	13	15.3	—2.3	3.9
7	10	11.0	—1.0	3.3
8	5	6.9	—1.9	2.6
9	4	3.9	+0.1	2.0
10	3	2.0	+1.0	1.4
11	7	0.9	+6.1	1.0
12	1	0.4	+0.6	0.6
13	1	0.2	+0.8	0.4
14	0	0.1	—0.1	0.2
15	0	0.0	0.0	0.1
16	0	0.0	0.0	0.1
17	0	0.0	0.0	0.0
18	0	0.0	0.0	0.0
19	0	0.0	0.0	0.0
20	0	0.0	0.0	0.0
21	1	0.0	+1.0	0.0

$n_c = 6$

n_o	N_o	N_c	$N_o - N_c$	$\sqrt{N_c}$
0	1	0.2	+0.8	0.4
1	1	1.0	0.0	1.0
2	3	3.0	0.0	1.7
3	7	5.9	+1.1	2.4
4	14	8.8	+5.2	2.9
5	8	10.5	—2.5	3.2
6	5	10.5	—5.5	3.2
7	8	9.0	—1.0	3.0
8	7	6.8	+0.2	2.6
9	3	4.5	—1.5	2.1
10	1	2.8	—1.8	1.6
11	1	1.5	—0.5	1.2
12	3	0.8	+2.2	0.9
13	1	0.4	+0.6	0.6
14	2	0.2	+1.8	0.4
15	0	0.1	—0.1	0.3
16	1	0.0	+1.0	0.2
17	0	0.0	0.0	0.1
18	0	0.0	0.0	0.1

$n_c = 7$

n_o	N_o	N_c	$N_o - N_c$	$\sqrt{N_c}$
0	0	0.0	0.0	0.2
1	0	0.3	—0.3	0.5
2	3	1.0	+2.0	1.0
3	3	2.3	+0.7	1.5
4	3	4.0	—1.0	2.0
5	3	5.6	—2.6	2.4
6	7	6.5	+0.5	2.6
7	4	6.5	—2.5	2.6
8	2	5.7	—3.7	2.4
9	4	4.4	—0.4	2.1
10	2	3.1	—1.1	1.8
11	4	2.0	+2.0	1.4
12	5	1.2	+3.8	1.1
13	2	0.6	+1.4	0.8
14	0	0.3	—0.3	0.6
15	0	0.2	—0.2	0.4
16	1	0.1	+0.9	0.3
17	0	0.0	0.0	0.2
18	0	0.0	0.0	0.1
19	0	0.0	0.0	0.0
20	1	0.0	+1.0	0.0

$n_c = 8$

n_o	N_o	N_c	$N_o - N_c$	$\sqrt{N_c}$
0	0	0.0	0.0	0.1
1	0	0.1	—0.1	0.2
2	0	0.2	—0.2	0.5
3	0	0.6	—0.6	0.8
4	3	1.2	+1.8	1.1
5	2	1.9	+0.1	1.4
6	0	2.6	—2.6	1.6
7	4	2.9	+1.1	1.7
8	3	2.9	+0.1	1.7
9	2	2.6	—0.6	1.6
10	0	2.1	—2.1	1.4
11	3	1.5	+1.5	1.2
12	1	1.0	0.0	1.0
13	0	0.6	—0.6	0.8
14	1	0.4	+0.6	0.6
15	1	0.2	+0.8	0.4
16	0	0.1	—0.1	0.3
17	0	0.0	0.0	0.2
18	0	0.0	0.0	0.1
19	0	0.0	0.0	0.1
20	1	0.0	+1.0	0.1

$n_c = 9$

n_o	N_o	N_c	$N_o - N_c$	$\sqrt{N_c}$
0	0	0.0	0.0	0.0
1	0	0.0	0.0	0.1
2	0	0.0	0.0	0.2
3	0	0.1	—0.1	0.3
4	0	0.2	—0.2	0.5
5	1	0.4	+0.6	0.7
6	1	0.6	+0.4	0.8
7	2	0.8	+1.2	0.9
8	1	0.9	+0.1	1.0
9	0	0.9	—0.9	1.0
10	1	0.8	+0.2	0.9
11	1	0.7	+0.3	0.8
12	0	0.5	—0.5	0.7
13	0	0.4	—0.4	0.6
14	0	0.2	—0.2	0.5
15	0	0.1	—0.1	0.4
16	0	0.1	—0.1	0.3
17	0	0.0	0.0	0.2
18	0	0.0	0.0	0.1
19	0	0.0	0.0	0.1
20	0	0.0	0.0	0.1

$n_c = 10$

n_o	N_o	N_c	$N_o - N_c$	$\sqrt{N_c}$
0	0	0.0	0.0	0.0
1	0	0.0	0.0	0.1
2	0	0.0	0.0	0.1
3	0	0.1	—0.1	0.2
4	0	0.1	—0.1	0.4
5	0	0.3	—0.3	0.5
6	1	0.4	+0.6	0.7
7	0	0.6	—0.6	0.8
8	0	0.8	—0.8	0.9
9	2	0.9	+1.1	0.9
10	0	0.9	—0.9	0.9
11	0	0.8	—0.8	0.9
12	1	0.7	+0.3	0.8
13	0	0.5	—0.5	0.7
14	0	0.4	—0.4	0.6
15	0	0.2	—0.2	0.5
16	1	0.2	+0.8	0.4
17	1	0.1	+0.9	0.3
18	0	0.1	—0.1	0.2
19	0	0.0	0.0	0.2
20	0	0.0	0.0	0.1
21	0	0.0	0.0	0.1
22	0	0.0	0.0	0.1
23	0	0.0	0.0	0.0
24	0	0.0	0.0	0.0
25	0	0.0	0.0	0.0
26	0	0.0	0.0	0.0
27	0	0.0	0.0	0.0
28	0	0.0	0.0	0.0
29	0	0.0	0.0	0.0
30	1	0.0	+1.0	0.0

Table IX

n_o	N_o	N_c	$N_o - N_c$	$\sqrt{N_c}$
0	96	114.0	—18.0	10.7
1	186	191.2	— 5.2	13.8
2	247	205.2	+41.8	14.3
3	168	178.1	—10.1	13.4
4	138	137.5	+ 0.5	11.7
5	76	99.6	—23.6	10.0
6	66	69.4	— 3.4	8.3
7	42	47.2	— 5.2	6.9
8	34	31.3	+ 2.7	5.6
9	21	20.3	+ 0.7	4.5
10	7	12.8	— 5.8	3.6
11	16	7.8	+ 8.2	2.8
12	12	4.7	+ 7.3	2.2
13	4	2.7	+ 1.3	1.6
14	3	1.5	+ 1.5	1.2
15	1	0.8	+ 0.2	0.9
16	3	0.4	+ 2.6	0.7
17	1	0.2	+ 0.8	0.5
18	0	0.1	— 0.1	0.3
19	0	0.1	— 0.1	0.2
20	2	0.0	+ 2.0	0.1
21	1	0.0	+ 1.0	0.1
22	0	0.0	0.0	0.0
23	0	0.0	0.0	0.0
24	0	0.0	0.0	0.0
25	0	0.0	0.0	0.0
26	0	0.0	0.0	0.0
27	0	0.0	0.0	0.0
28	0	0.0	0.0	0.0
29	0	0.0	0.0	0.0
30	1	0.0	+ 1.0	0.0

The presence of meteor showers would appear in a systematic excess of N_o over N_c for the highest values of n_o. As a matter of fact, such excess takes place for almost all values of n_c. It is clearly shown particularly in the lower part of Table IX; however, this table is not liable for a quantitative investigation, because short observations of enhanced hourly rate (n_c small, $n_o >> n_c$) are intermingled with long observations of normal hourly rate

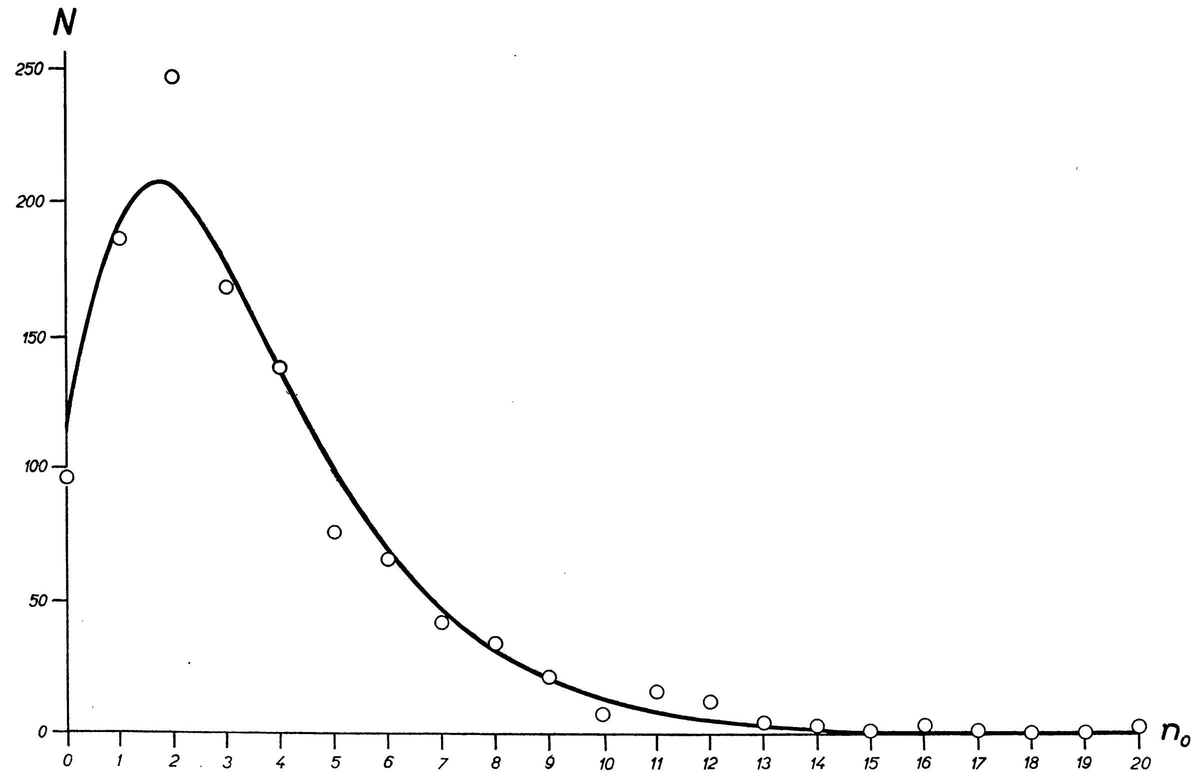

Figure 8.

(n_c large, $n_o \gtreqless n_c$). For that reason the tails of the Poisson curves for different n_c have been compared with the observations in the following way:

For each n_c we have found two values of n_o — denoted by $i(n_c)$ and $j(n_c)$ — which are whole numbers and for which

$$\sum_{n_o=i}^{n_o=\infty} N_c(n_o) < 0.1 \sum_{n_o=0}^{n_o=\infty} N_c(n_o) \tag{13}$$

$$\sum_{n_o=i-1}^{n_o=\infty} N_c(n_o) > 0.1 \sum_{n_o=0}^{n_o=\infty} N_c(n_o) \tag{14}$$

$$\sum_{n_o=j}^{n_o=\infty} N_c(n_o) < 0.01 \sum_{n_o=0}^{n_o=\infty} N_c(n_o) \tag{15}$$

$$\sum_{n_o=j-1}^{n_o=\infty} N_c(n_o) > 0.01 \sum_{n_o=0}^{n_o=\infty} N_c(n_o) \tag{16}$$

Using this limitation we may compare the values of N_o and N_c for a sample of observations with $n_o \geqq i(n_c)$ or $n_o \geqq j(n_c)$, respectively, by summing them without regard to n_c; in this way we get the cases of the most probable shower activity. The results following from the selection are summarized in Table X. We see that there are about 1.6 times as much observations with $n_o \geqq i$ and about 3.2 times as much observations with $n_o \geqq j$ as we may expect on the basis of a random distribution of meteors. For $n \geqq i$ (i. e. for a weak shower activity) about 4.1 % of all observations indicate the presence of a shower; for $n_o \geqq j$ (i. e. for a sens ible shower activity) there are only 1.4 % of the total. Due to the varying conditions (different atmospheric conditions, coefficients of perception, altitudes of the field of view etc.), these value must be taken for the upper extreme, the real percentages being even somewhat lower.

On the basis of similar considerations still ans other interesting problem may be solved: in how many nights per year the shower activity is higher than the activity of sporadic meteors. In this case the tails of the Poisson curves are delimited by putting

$$n_o > 2n_c \tag{17}$$

As we see from Table XI, there are 1.7 times as much observations with $n_o > 2n_c$ as we may expect if the meteors were distributed at random. According to the sum of the differences $O-C$, the activity of the showers seems to be higher than the activity of sporadic meteors for 31 observations, i. e. for about 10 (± 2) nights of the year. However, for the reason explained above, also this estimate must be taken for a maximum.

Table X

n_c	i	$\sum_i^\infty N_o$	$\sum_i^\infty N_c$	$O-C$	$\sqrt{\sum_i^\infty N_c}$	j	$\sum_j^\infty N_o$	$\sum_j^\infty N_c$	$O-C$	$\sqrt{\sum_j^\infty N_c}$
1	3	18	10.5	+7.5	3.2	5	3	0.8	+2.2	0.9
2	5	29	21.0	+8.0	4.6	7	7	2.2	+4.8	1.5
3	6	27	21.7	+5.3	4.7	9	3	1.1	+1.9	1.1
4	8	13	8.2	+4.8	2.9	10	1	1.4	—0.4	1.2
5	9	16	7.5	+8.5	2.7	12	2	0.6	+1.4	0.8
6	10	9	5.6	+3.4	2.4	13	4	0.6	+3.4	0.8
7	12	9	2.5	+6.5	1.6	15	2	0.3	+1.7	0.5
8	13	3	1.4	+1.6	1.2	16	1	0.2	+0.8	0.4
9	14	0	0.5	—0.5	0.7	18	0	0.0	0.0	0.2
10	15	2	0.6	+1.4	0.8	19	0	0.0	0.0	0.2
1—10	—	126	79.4	+46.6	—	—	23	7.2	+15.8	—

Table XI

n_c	$\sum_{n_o=2n_c+1}^\infty N_o$	$\sum_{n_o=2n_c+1}^\infty N_c$	$O-C$
1	18	10.5	+7.5
2	29	21.0	+8.0
3	11	9.0	+2.0
4	4	3.5	+0.5
5	9	1.6	+7.4
6	4	0.6	+3.4
7	1	0.3	+0.7
8	1	0.1	+0.9
9	0	0.0	+0.0
10	1	0.0	+1.0
1—10	78	46.6	+31.4

It is interesting to compare our result, obtained from the telescopic observations, with the number of nights per year, during which the visual rates of meteor showers exceed those of sporadic meteors. The number of such nights may be estimated at about 16 (i. e. 1 night for Quadrantids, 1 for Lyrids, 5 for Perseids, 3 for Orionids, 1 for Leonids and 5 for Geminids). Hence it seems probable that the abundance of showers is less among the telescopic meteors than among the naked-eye ones, and that the meteor streams generally contain only comparatively few faint meteors.

7. *On the Presence of Meteor Showers — Detailed Investigations*

The problem of identification of individual meteor showers in the present material is rather complicated due to the fact that there are only statistical data concerning the hourly rates. Exceptin but very few cases it cannot be directly stated whether there is an active shower or a random enhancement of sporadic meteors. We can base our considerations on the Law of Chance only and compare the occurence of abnormally high hourly rates with the a priori probabilities of such exceptional events.

The observations, for which the probability of a shower activity is large, are obviously identical with those, for which the a priori probability of the observed event computed by supposing a random distribution of meteors is small. By inserting the definitive values of f_c given in Table V, together with the observed quantities n, H, τ, into formulae (2)—(3), we may compute the a priori probability P' that the observed hourly rate f_o will be at least as high as it actually is.

For a detailed investigation only those observations have been chosen for which $P' < 0.02$. They are tabulated below, in the same arrangement as in Table II, excepting the last two adjoined columns which contain the probabilities P' and remarks. We see that there are 25 observations for which $P' < 0.01$, and 17 observations for which $0.01 < P' < 0.02$. With regard to the total number of observations (1126) we should expect that only about 11 cases in each group refer to the sporadic meteors. Consequently, about 20 observations of the Table, especially those of lower P', indicate the presence of meteor showers.

An additional argument for the presence of meteor showers consists in grouping the observations of $P' < 0.02$ near certain Sun's longitudes. This grouping, which cannot be explained by a fortuitous coincidence, simultaneously represents a proper criterion as to which observations of the Table may really refer to meteor showers. There are six periods of such activity, marked by the numbers 1—6 in the last column; eliminating them, only 8 cases of $P' < 0.01$ and 12 cases of $0.01 < P' < 0.02$ remain. These numbers agree well with those

Table XII

No	⊙	Date	Time M. E. T.	Obs.	τ	n_o	n_c	H	f_o	f_c	F	P	Act.
56	18.2	1948 IV. 8.	02 05—03 30	M	80	12	5	+ 7	9.0	3.4	2.6	0.002	
64	20.2	1947 IV. 10.	22 45—23 40	K	55	7	2	—22	7.6	2.6	2.9	0.011	
137	44.2	1949 V. 5.	00 40—01 20	M	40	6	2	— 2	9.0	3.1	2.9	0.019	
166	54.7	1949 V. 15.	21 00—23 20	M	130	12	6	—25	5.5	2.5	2.2	0.010	
301	110.4	1948 VII. 12.	22 55—23 37	M	35	6	2	+ 4	10.3	3.3	3.1	0.014	
321	114.7	1946 VII. 17.	22 50—23 30	K	35	6	2	+ 5	10.3	3.3	3.1	0.014	
341	119.0	1952 VII. 21.	23 15—00 56	V	40	7	2	+15	10.5	3.6	2.9	0.012	
355	121.6	1949 VII. 24.	22 10—23 40	M	90	11	5	+ 4	7.3	3.3	2.2	0.013	
381	126.6	1948 VII. 29.	21 30—22 35	M	120	13	6	— 4	6.5	3.1	2.1	0.011	
396	130.5	1948 VIII. 2.	23 30—01 15	P	80	13	5	+21	9.8	3.8	2.6	0.002	1
402	131.3	1949 VIII. 4.	01 00—02 30	M	90	14	6	+34	9.3	4.2	2.2	0.005	1
404	131.4	1948 VIII. 3.	22 05—22 50	P	45	8	2	+ 3	10.7	3.3	3.2	0.004	1
419	136.2	1948 VIII. 8.	21 15—23 00	B	85	10	5	+ 1	7.1	3.2	2.2	0.019	
450	150.6	1952 VIII. 23.	20 55—22 10	K	65	9	3	— 1	8.3	3.2	2.6	0.008	
485	156.8	1951 VIII. 31.	00 20—01 45	K	75	11	5	+33	8.8	4.1	2.1	0.016	2
488	157.2	1949 VIII. 30.	23 00—01 00	M	120	15	8	+22	7.5	3.8	2.0	0.011	2
497	158.3	1949 IX. 1.	01 00—03 20	M	140	30	10	+43	12.9	4.4	2.9	0.000001	2
498	158.6	1948 VIII. 31.	22 00—23 45	M	105	16	6	+12	9.1	3.5	2.6	0.0004	2
561	169.2	1948 IX. 12.	02 45—03 50	Ce	60	10	5	+54	10.0	4.6	2.2	0.020	
606	175.7	1949 IX. 18.	23 40—00 25	K	40	9	3	+24	13.5	3.9	3.5	0.0016	
633	182.7	1949 IX. 26.	02 30—04 00	M	90	16	7	+53	10.7	4.6	2.3	0.012	3
635	183.4	1946 IX. 26.	23 20—23 50	K	25	5	2	+18	12.0	3.7	3.2	0.020	3
639	183.6	1948 IX. 26.	19 40—21 40	M	80	12	4	— 5	9.0	3.0	3.0	0.001	3
656	186.3	1946 IX. 30.	01 30—02 00	D	20	5	1	+40	15.0	4.3	3.5	0.016	3
657	186.3	1946 IX. 30.	02 00—02 30	D	27	6	2	+44	13.3	4.4	3.0	0.016	3
658	186.4	1946 IX. 30.	02 30—03 00	D	27	8	2	+48	17.8	4.5	4.0	0.001	3
685	192.9	1950 X. 6.	19 45—21 00	P	95	11	5	— 8	6.9	3.8	2.3	0.009	4
686	193.5	1948 X. 6.	20 40—21 30	B	45	8	2	— 3	10.7	3.1	3.5	0.003	4
693	194.9	1950 X. 8.	18 45—20 45	P	100	11	5	—11	6.6	2.9	2.3	0.010	4
711	200.8	1946 X. 14.	18 00—18 30	K	30	6	1	—17	12.0	2.7	4.4	0.003	
755	209.8	1947 X. 24.	01 30—03 15	P	70	11	5	+42	9.4	4.4	2.1	0.016	
772	212.4	1949 X. 26.	03 25—05 00	P	85	13	7	+55	9.2	4.7	2.0	0.019	
786	215.0	1953 X. 28.	18 00—18 55	K	50	8	2	—20	9.6	2.7	3.6	0.002	
848	248.4	1946 XII. 1.	04 15—05 25	M	70	21	5	+47	18.0	4.5	4.0	0.0000002	5
860	253.8	1948 XII. 6.	00 40—02 00	M	100	14	6	+21	8.4	3.8	2.2	0.005	6
868	255.9	1948 XII. 8.	02 00—04 00	M	120	20	8	+35	10.0	4.2	2.4	0.0005	6
*	256.6	1953 XII. 8.	22 30—00 15	V	65	9	4	+ 2	8.3	3.2	2.6	0.010	6
871	257.0	1948 XII. 9.	03 30—05 00	M	90	20	7	+42	13.3	4.4	3.0	0.00002	6
876	258.0	1948 XII. 10.	04 00—04 50	P	45	9	3	+42	12.0	4.4	2.7	0.006	6
880	258.9	1947 XII. 11.	20 00—20 30	K	30	5	1	—25	10.0	2.5	4.0	0.009	6
934	270.5	1946 XII. 22.	23 00—00 30	D	48	8	3	+ 1	10.0	3.2	3.1	0.005	
940	275.9	1946 XII. 27.	04 35—05 00	D	30	7	2	+37	14.0	4.2	3.3	0.006	
1062	328.3	1947 II. 17.	18 20—19 40	M	80	8	3	—56	6.0	2.0	3.0	0.006	

expected for a random distribution of sporadic meteors. Particular data concerning the principal features of the six periods of activity (see also Figure 5) are discussed below:

1. Three observations between Sun's longitude 130° and 132° (about August 3; N° 396, 402 and 404) indicate a shower with the radiant in the night sky; several additional observations with $P' < 0.02$ support its reality (N° 395, 397 and 403). The shower seems to have returned in 1948 with about 1.5-fold rate of the sporadic meteors and probably also in 1949 with a reduced rate. The observations of 1952 indicate no activity. The period of activity falls on the descending branch of the Delta Aquarid meteor shower; however the identity with this shower seems to be unpossible for the following three reasons: 1. The operation of the Poynting—Robertson effect would shift the maximum of faint meteors to the ascending branch of the brighter ones and not to the descending one; 2. the existence of such shift has been actually established by Lindblad [4] on the basis of radio-echo observations; 3. in morning hours no expected increase of activity takes place. The identity with the Perseid or Cygnid streams seems to be very improbable too.

2. Four observations between the Sun's longitudes 156° and 159° (about August 31; N° 485, 488, 497 and 498; further supporting observations N° 489 and 490) indicate another night-time shower approximately as rich as the preceding. The observations relate to the years 1948, 1949 and 1951; during the less numerous observations in 1946, 1950 and 1953 no activity has been ascertained. The enhancement of the hourly rate for N° 497 is striking and cannot

be fortuitous; the identity with the Aurigid stream is not excluded.

3. Six observations between $\odot = 182°$ and $\odot = 188°$ (about September 28; N° 633, 635, 639, 656, 657, 658) represent another centre of activity in the night sky. Its reality is supported by the observations N° 634, 638, 654, 655, 665 and 667. A great majority of these observations falls on 1946, for which the activity is established beyond doubt. The right complete series of observations on September 29/30 of this year (N° 653—659) shows a striking enhancement (almost two times as high as the activity of sporadic meteors) with a maximum near 2 o'clock a. m. From the course of activity we may conclude that the right ascension of the radiant may be about 3^h. There is no relation to any known stream.

4. The next period of activity at $\odot = 192°$ to $\odot = 195°$ may be perhaps associated with the preceding one. There are three observations with $P' < 0.02$ (N° 685, 686 and 693) and two additional observations with $F > 2$ (683, 684); if there is no separation between the centres 3 and 4, two more observations with $F > 2$ (N° 676 and 679) may be included. The radiant seems to be situated in the evening sky; in 1948 and 1950 its meteors were most abundant. Also in this case no relation to any known shower is indicated.

It is essential to emphasize that the double centre 3—4 is very likely restricted to telescopic meteors only, and that its existence produces the single substantial deviation of the yearly variation of telescopic meteors in comparison with that of naked-eye meteors, found in the 5th paragraph (cf. Figure 6).

5. The fifth centre of activity at $\odot = 247°$ to $\odot = 249°$, possibly associated with the next following, is represented by but one observation with $P' < 0.01$ (N° 848 of Dec. 1, 1946); the hourly rate, however, is so high that it must be ascribed to a shower. The activity is about threefold against the sporadic background and the radiant is probably situated in the morning sky. The value of P' is the smallest one found in the present 1126 observations. Two neighbouring observations (N° 847 and 849) support the reality of the phenomenon.

6. The last suggested period of activity situated between $\odot = 253°$ and $\odot = 259°$ (about Dec. 9) is represented by five observations (N° 860, 868, 871, 876 and 880). Most of them fall on 1948 when the shower seems to have been extraordinary active; the observations after midnight show an increased activity compared with those made before midnight. For different reasons we may ascribe a high degree of probability to the opinion that this centre of activity is associated with the visual Geminid stream. After closing the series of observations treated here, an additional watch on December 8, 1953 has been carried out with a special regard to the directions of the meteors; its result (included in Table XII and denoted by an asterisk) confirms the above opinion. Unfortunately, the epoch of maximum activity cannot be derived rigorously from the observations. However, the maximum seems to occur a few day before the maximum of naked-eye Geminids, which fact would favour the reality of the Poynting—Robertson shift.

Except the case of Geminids the presence of no major meteor shower is indicated. Hence we may conclude that there is an apparent lack of faint meteors in the known cometary streams or that their orbits are considerably dispersed.

It must be pointed out that our considerations relate only to showers whose activity is at least comparable with the activity of sporadic meteors. There may exist a number of less abundant meteor streams of moderate hourly rates and long duration (such as the known ecliptical streams) which cannot be regarded separately but only as a contribution to the general course of yearly variation.

8. *Conclusions*

1. The dependence of the hourly rate upon the altitude of the apex is for telescopic meteors not so pronounced as for the visual ones; it corresponds to an effective heliocentric velocity $c = 3.9$. This fact may be explained by two different reasons: either a selection according to the velocities apparently diminishes the concentration of radiants to the apex, or the direct orbits prevail over retrograde to a greater extent among telescopic meteors than among the brighter ones.

2. Even after eliminating the influence of the position of the apex, the rates of telescopic meteors show certain yearly variations entirely consisting with the variation of naked-eye sporadic meteors derived by Hoffmeister for the northern hemisphere. A relative enhancement of the telescopic activity occurs only at the end of September and at the beginning of October. Evidently no substantial difference exist between the arrangement of naked-eye meteor orbits and of telescopic ones.

3. Meteor showers are also found among telescopic meteors, but reduced in abundance, compared with the naked-eye observations. The telescopic activity of meteor showers does not exceed that of sporadic meteors on more than ten nights per year.

4. Sudden increases of hourly rates of telescopic meteors have been observed especially at the Sun's longitudes of about 131°, 158°, 184°, 194°, 248° and 257°. The last increase is probably associated with the Geminid stream; the other known major showers do not appear in the statistics of telescopic meteors.

5. The small numbers of telescopic meteors in the major cometary streams, exhibiting considerable activity in the naked-eye range, may be explained by the operation of the Poynting—Robertson effect or by an abnormal dispersion of orbits of smaller meteors. The Poynting—Robertson effect may be also responsible for an indicated shift of the maximum epoch of the Geminid shower.

APPENDIX

In addition to the activity of telescopic meteors three related problems have been investigated: the dependence between the brightness and the average angular length, the luminosity function, and the ratio of the heights of appearance and disappearance of telescopic meteors for different magnitudes.

I. The Apparent Angular Lengths of Telescopic Meteors

The estimates of the angular lengths of the meteors' visible paths are important for two reasons. Firstly, if correlated with the apparent magnitudes, they allow to evaluate directly the ratio of the real lengths of unequally bright meteors. Secondly, the knowledge of the angular lengths admits to compute the size of the effective field of view for different telescopes. This is necessary so for reducing the observed hourly rates to the whole visible hemisphere as for correcting the course of the luminosity function, which for the telescopic observations is distorted not only by the different coefficients of perception, but also by different effective fields for various magnitudes.

The average angular lengths of the meteors have been deduced from the statistics of the types of visibility. These have been recorded for 1653 meteors by using the following notation:

Type 11: The whole visible path lied inside the field of view.

Type 10: The meteor left the field — only the point of appearance lied inside.

Type 01: The meteor penetrated the field — only the point of disappearance lied inside.

Type 00: The meteor crossed the field, both limiting point lying outside.

It is obvious that the proportional representation of the different types is a function of the angular lengths of the meteors l and of the angular diameter of the field d. The a priori probability P_t that a path of a meteor, l degrees long, will appear as type $t = 11$, 10, 01 or 00 is given by the formulae:

A. For $\lambda = \frac{l}{d} \geqq 1$:

$$P_{11} = 0 \tag{1}$$

$$P_{10} = P_{01} = \frac{\pi}{4\lambda + \pi} \tag{2}$$

$$P_{00} = \frac{4\lambda - \pi}{4\lambda + \pi} \tag{3}$$

B. For $\lambda = \frac{l}{d} \leqq 1$:

$$P_{11} = \frac{2 \cos^{-1}\lambda - 2\lambda\sqrt{1 - \lambda^2}}{4\lambda + \pi} \tag{4}$$

$$P_{10} = P_{01} = \frac{\pi - 2\cos^{-1}\lambda + 2\lambda\sqrt{1 - \lambda^2}}{4\lambda + \pi} \tag{5}$$

$$P_{00} = \frac{4\lambda - \pi + 2\cos^{-1}\lambda - 2\lambda\sqrt{1 - \lambda^2}}{4\lambda + \pi} \tag{6}$$

where we put

$$\frac{l}{d} = \lambda = \cos\omega \quad \text{for } l \leqq d \tag{5}$$

$$\frac{l}{d} = \lambda \quad \text{for } l \geqq d \tag{6}$$

The average angular length of a group of N meteors (N_{11} of them belonging to the type 11, N_{10} to the type 10, N_{01} to the type 01 and N_{00} to the type 00) may be defined by the following relation:

$$\varrho = \frac{M'}{M} = \frac{1}{\frac{4\lambda}{\pi} + 1} \tag{7}$$

where M' denotes the number of limiting points of the paths observed inside the field of view,

$$M' = 2N_{11} + N_{10} + N_{01} \tag{8}$$

and M the total number of the limiting points,

$$M = 2N_{11} + 2N_{10} + 2N_{01} + 2N_{00} \tag{9}$$

Obviously it is supposed that the number of observed meteors is sufficient to make the frequencies of individual types proportional to the respective probabilities, i. e.

$$N_t = NP_t \qquad (10)$$

The probabilities P_t are tabulated below for selected arguments λ. The values of ϱ, computed according to (7), are adjoined in the last column of the Table.

Table XIII

λ	P_{11}	$P_{10} = P_{01}$	P_{00}	ϱ
0.0	1.000	0.000	0.000	1.000
0.1	0.774	0.113	0.000	0.887
0.2	0.595	0.202	0.001	0.797
0.3	0.452	0.272	0.004	0.724
0.4	0.335	0.328	0.009	0.663
0.5	0.239	0.373	0.017	0.611
0.6	0.161	0.406	0.028	0.567
0.7	0.100	0.429	0.042	0.529
0.8	0.052	0.444	0.061	0.495
0.9	0.017	0.449	0.085	0.466
1.0	0.000	0.440	0.120	0.440
1.2	0.000	0.396	0.209	0.396
1.4	0.000	0.359	0.281	0.359
1.6	0.000	0.329	0.341	0.329
1.8	0.000	0.304	0.393	0.304
2.0	0.000	0.282	0.436	0.282
2.5	0.000	0.239	0.522	0.239
3.0	0.000	0.207	0.585	0.207
3.5	0.000	0.183	0.633	0.183
4.0	0.000	0.164	0.672	0.164
4.5	0.000	0.149	0.703	0.149
5.0	0.000	0.136	0.728	0.136
6.0	0.000	0.116	0.768	0.116
7.0	0.000	0.101	0.798	0.101
8.0	0.000	0.089	0.821	0.089
9.0	0.000	0.080	0.839	0.080
10.0	0.000	0.073	0.854	0.073

The observed distribution of various types for different magnitudes is shown in Table XIV together with the values derived from the observations. (The fractions in the meteor numbers come from distributing the few meteors, for which the brightness has been estimated to 0.5^m, uniformly into the two neighbouring classes.) In order to evaluate the dependence between the angular length and magnitude, we have computed ϱ for the range $\langle m - 1, m + 1 \rangle$ by summing each three neighbouring rows in Table XIV and determining simultaneously the average magnitude for each group. The results are shown in Table XV and Figure 9. It is seen from the Figure that a continuous curve may be well fitted to all plotted points except the first ones which, after all, are subjected to a considerable uncertainty due to the small numbers of meteors included. The angular lengths λ, expressed in terms of the diameter of the field of view, have been converted into degrees by assuming $d = 3°20'$. The actual diameter was 3°36'; however, it has been thought correct to adopt a little smaller value for our purpose, as the beginning or end point of the path can be scarcely witnessed if it lies to oclose too the field's border.

The inverse value to ϱ indicates the effective increase of the field of view for the meteors of a

Table XIV

m	N_{11}	N_{10}	N_{01}	N_{00}	N	ϱ
0	0	0	0	2	2	0.000
1	0	0	0	7	7	0.000
2	0	3	1	8	12	0.167
3	3	5	1	13.5	22.5	0.267
4	2	3.5	2	28.5	36	0.132
5	3	13.5	9	51	76.5	0.186
6	6	47.5	16	120	189.5	0.199
7	39.5	87.5	40	176	343	0.301
8	79.5	116.5	78	176	450	0.393
9	86	79.5	85.5	142.5	393.5	0.429
10	33	23	17.5	44	117.5	0.453
11	1	1	1	0.5	3.5	0.571
0—11	253	380	251	769	1653	0.344

Table XV

m	ϱ	λ	l
0.78	0.000	∞	∞
1.48	0.095	7.50	25
2.37	0.193	3.29	11
3.34	0.181	3.55	12
4.40	0.185	3.45	11.5
5.61	0.225	2.72	9.1
6.44	0.255	2.31	7.7
7.27	0.323	1.65	5.5
8.04	0.378	1.30	4.3
8.65	0.415	1.11	3.7
9.24	0.435	1.02	3.4
10.03	0.457	0.93	3.1
7.57	0.344	1.49	5.0

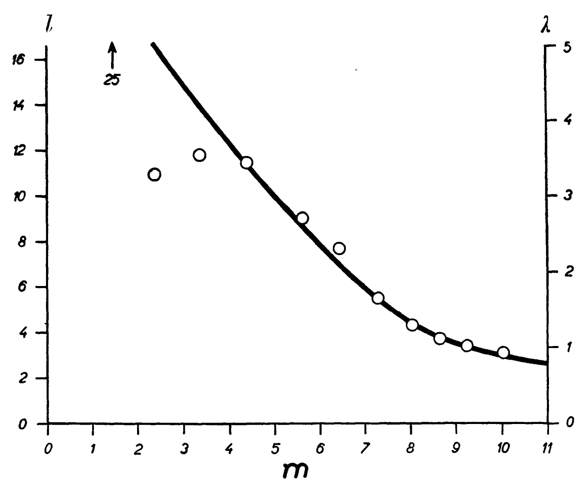

Figure 9.

given angular length. The ratio R_g of the area of the visible hemisphere to the area of the geometrical field of view is given by

$$R_g = \frac{8}{\text{arc}^2\, d} \tag{11}$$

and the ratio R_e to the effective field of view by

$$R_e = \frac{8\, \varrho}{\text{arc}^2\, d} \tag{12}$$

The numerical values of R_e for the telescope with $d = 3°36'$ are shown in the last column of Table XVI together with the smoothed values of ϱ, λ, and l.

Table XVI

m	ϱ	λ	l	R_e
0	0.104	6.77	22.6	265
1	0.115	6.04	20.1	293
2	0.130	5.26	17.5	331
3	0.149	4.49	15.0	379
4	0.173	3.75	12.5	440
5	0.206	3.03	10.1	524
6	0.250	2.36	7.9	636
7	0.306	1.79	6.0	779
8	0.369	1.34	4.5	939
9	0.428	1.05	3.5	1090
10	0.475	0.87	2.9	1209
11	0.503	0.78	2.6	1281

II. The Luminosity Function of Telescopic Meteors

The basic data for investigating the luminosity function are quoted in Table XVII, where the distribution of recorded magnitudes is shown separately for each observer (for abbreviations cf. Table I). The total numbers n of meteors of individual magnitudes m and their percentages p are given in the second and third column of Table XVIII. The numbers n', reduced to an equivalent field of view according to the relation

$$n' = \varrho n, \tag{13}$$

(ϱ being taken from Table XVI), the respective percentages p' and their logarithms are given in the next three columns. The course of the dependence of p and p' upon m is graphically represented by the two histograms of Figure 10, and the dependence of $\log p'$ upon m by Figure 11. It is seen from the Figure that down to the 7[th] magnitude the value of $\log p'$ uniformly increases with decreasing brightness; the slope of the straight line defines the constant of the luminosity function $\varkappa$:

$$\log n_{m+1} - \log n_m = 0.389 \tag{14}$$

or

$$\varkappa = \frac{n_{m+1}}{n_m} = 2.45 \tag{15}$$

Beginning with the 8[th] magnitude the increase of $\log p'$ becomes sensibly slower and after reaching the maximum between 8^m and 9^m the meteor numbers begin to decrease until they drop to zero at 12^m. Indubitably, the general decrease is due to the changes of the coefficient of perception but the question remains whether it is not too pronounced to be accounted for this reason only. Nothwithstanding the effect of different angular velocities we may expect that the coefficient of perception for the meteors near the limits of visibility will not show stronger variations in case of

Table XVII

Obs.	m												
	0	1	2	3	4	5	6	7	8	9	10	11	Σ
K	2	5	9	14.5	24	42	99.5	186	255.5	260.5	88	2	988
P					3	12	37	62	81	69	4		268
D			1	3	5	19	39.5	60	83.5	29.5	11	1.5	253
V		2	2	1	3	7	17	21	19	12	9		93
Pl				1		0.5	2.5	9	22.5	24	4.5		64
Bo					1.5	3.5	8	19	12	2			46
Za					1	2	9	8	15	7			42
Ča				2	3	1	6	10	8	3			33
Bk				1		1	2	7	7	3	1		22
M							2	5	2	1			10
Š				1	1	1	1	3		2			9
Va							1	5	1				7
Pa							1	2	1				4
Kr				1					1				2
B						1							1
Σ	2	7	12	24.5	41.5	90	225.5	397	508.5	413	117.5	3.5	1842

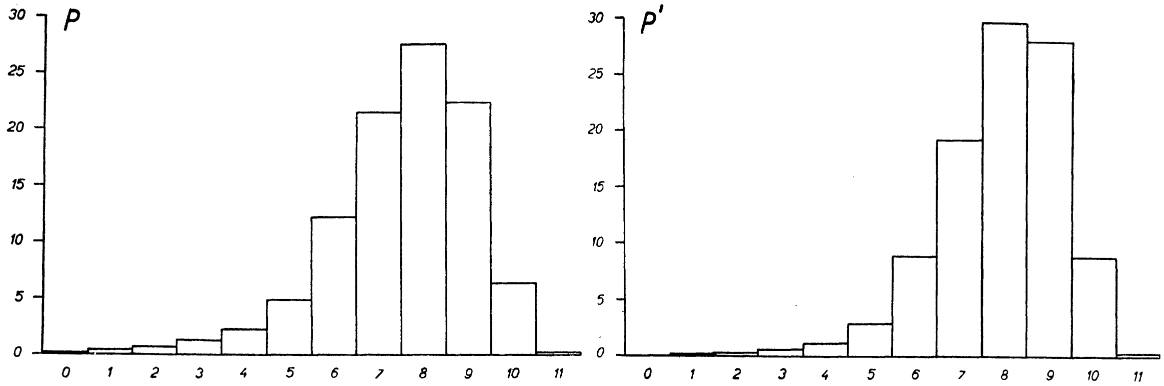

Figure 10.

Table XVIII

m	n	p	n'	p'	$\log p'$	n_r	n_1
0	2	0.11	0.2	0.03	—1.48	0.9	0.4
1	7	0.38	0.8	0.13	—0.89	3.6	1.4
2	12	0.65	1.6	0.25	—0.60	6.9	1.8
3	24.5	1.33	3.7	0.58	—0.24	16.1	2.7
4	41.5	2.25	7.2	1.14	+0.06	31.7	3.2
5	90	4.89	18.5	2.93	+0.47	82.0	4.5
6	225.5	12.24	56.4	8.92	+0.95	249.1	0.0
7	397	21.55	121.5	19.23	+1.28	537.2	0.0
8	508.5	27.61	187.6	29.70	+1.47	829.6	0.0
9	413	22.42	176.8	27.98	+1.45	782.0	0,0
10	117.5	6.38	55.8	8.83	+0.95	246.8	0.0
11	3.5	0.19	1.8	0.28	—0.55	7.8	0.0
Σ	1842	100.00	631.8	100.00	—	2793.7	14.0

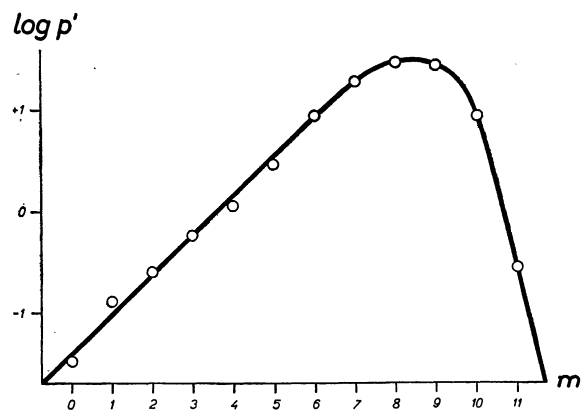

Figure 11.

telescopic observations than in case of visual ones. Indeed, for naked-eye observations the distance of the meteor from the point of view plays a more important rôle, as the paths projected on the retina are substantially shorter. The influence of the effect of angular velocity is not quite clear. However, we may reasonably suppose that it operates so as to decrease the effective magnitudes of observed meteors by an amount, statistically independent of the real magnitudes. Then the coefficients of perception for telescopic observations of meteors of a given magnitude m will be proportional to the coefficients for naked-eye observations of meteors of the magnitude $m - \Delta m$, only the difference Δm will be

$$\Delta m < 5 \log \frac{d}{d'} \tag{16}$$

where d denotes the aperture of the telescope and d' the aperture of the eye's pupil.

If we assume that the relation (14) holds true also for the meteors of $m \geqq 8$ and that no telescopic meteors of $m < 8$ remain unnoticed, we may work out the hypothetical coefficients of perception $C_a(m)$, based on this assumption, from:

$$C_a(m) = \frac{\left(1 - \frac{1}{\varkappa}\right) \varkappa^{m-7} \sum\limits_{m=-\infty}^{m=7} p'(m)}{p'(m)} \tag{17}$$

These coefficients are tabulated in the second column of Table XIX. For the sake of comparison the coefficients $C_v(m)$ derived from naked-eye observations by Oepik [5], Ceplecha [6] and one of the authors [7] are adjoined. It must be noted that the coefficients C_v have been homogenized by putting $C_v(2) = 1$ for each series, and that the invariability of C_a for $m < 8$ is caused by the artificial restriction of the telescopic field of view, in which brighter meteors are easily visible without regard to their individual magnitudes. A graphical representation of the dependence of C_a and C_v on m is given in the logarithmic form in Figure 12. The coefficients C_v are here replaced by the proportional coefficients c_v for the reduction of meteor numbers to the whole hemisphere (according to Kresák). C_v and c_v are correlated by

$$c_v(m) = 2.62\, C_v(m) \tag{18}$$

Table XIX

m	C_a	C_v		
		O	C	K
0	1.2	—	0.42	0.57
1	0.7	—	0.76	0.70
2	0.9	1.00	1.00	1.00
3	0.9	1.14	1.28	1.61
4	1.2	2.16	2.00	2.64
5	1.1	9.90	2.63	4.90
6	0.9	—	—	—
7	1.0	—	—	—
8	1.6	—	—	—
9	4.2	—	—	—
10	33	—	—	—
11	2500	—	—	—

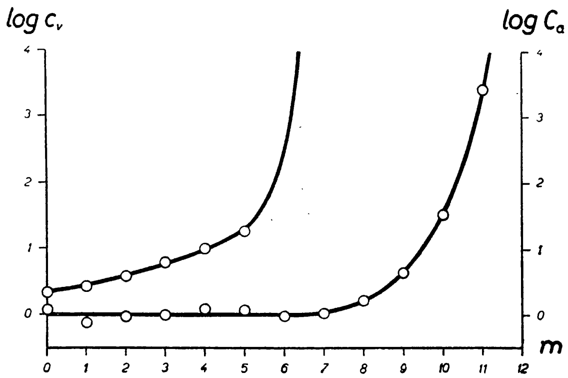

Figure 12.

It is seen from Table XIX that the course of C_v derived by Oepik agrees well with the course of C_a for $\Delta m \doteq 4.4^m$, i. e. for an effective decrease of brightness of telescopic meteors by about 1.5^m. However, the comparison with the values given by Kresák and especially those given by Ceplecha leads to a different result. It indicates slower variations of C_v than C_a and consequently supports the opinion that the decrease of $\varkappa$ for $m > 8$ is partially real and corresponds to a change in the luminosity function, possibly to an abrupt point like that found for several meteor showers. As it is difficult to distinct between these two possibilities, a new experimental revision of the coefficients of perception would be urgently needed. One reason of the discrepancies—a sensibly lower limiting stellar magnitude for the observations worked out by Oepik—has been already pointed out by Ceplecha [6]. This reason, nevertheless, would introduce a shift of m without any additional change of $\frac{dC_v}{dm}$. Another possible source of the discrepancies consists in the different arrangement of observations elaborated by the three authors, or in some systematic errors in the magnitude estimates.

To provide a check for the magnitude estimates of the present telescopic observations, the observed meteor numbers have been reduced to the whole visible hemisphere according to (12) and the results compared with those of visual observations. In the first part of the present study we have found that for the altitude of the Earth's apex $H = 0$ the average hourly rate $f(0)$ was about 3.2. On an average, the number $0.01\ p'\ f(0)$ from this amount falls on each magnitude class. Multiplying the latter amount by the quantity R_e (cf. formula 12 or Table XVI) we obtain the number of meteors $n_r(m)$, of a given apparent brightness m, reduced to the whole visible hemisphere:

$$n_r(m) = 0.01\ R_e\ f(0)\ p'(m) \qquad (19)$$

It must be emphasized that this number is not identical with the real number of meteors which appear over the horizon, since the coefficient of perception has not been taken into account. However, for the meteors brighter than 6^m, for which the present check is intended, the telescopic coefficient of perception sensibly equals to 1, so that there is no discrepancy between the two conceptions. The reduced numbers $n_r(m)$ for m between 0 and 11th magnitude are printed in the 7th column of Table XVIII. We see that there is a surprising multitude of about 400 meteors of 6th apparent magnitude and brighter, which may be seen per hour from a given place. The fraction $n_1(m)$ actually perceived by one observer is given by

$$n_1(m) = \frac{n_r(m)}{c_v(m)} \qquad (20)$$

The numbers $n_1(m)$, computed by using Kresák's values of c_v for the coefficient of perception are quoted in the last column of Table XIX. Their sum—i. e. the average naked-eye hourly rate derived from telescopic observations—is 14.0, whereas the value found directly from the naked-eye observations of sporadic meteors at Skalnaté Pleso Observatory (the majority of which was made by the same persons as the telescopic observations) is 11.5. With regard to the fact that the numerical factors appearing in formulae (19) and (20) have been derived empirically with a considerable uncertainty, the agreement between observation and theory is highly satisfactory. The adoption of a higher value of c_v (5) which would bring Kresák's value nearer to that given by Oepik, would make the coincidence even closer. Nothwithstanding this, the remaining deviation (22 %) may be removed by adopting a systematic correction of only $+0.2^m$ for the magnitude scale. Hence we may conclude that there is no larger systematic error in the magnitude estimates, at least in those of relatively bright meteors.

III. The Ratio of Beginning and End Heights of Telescopic Meteors

It has been shown by Teichgraeber [8] that this ratio may be directly evaluated from the statistics of beginning and end points of the luminous paths visible inside the field of the telescope. In our notation (cf. p. 71) we have:

$$\frac{H_1}{H_2} = \frac{N_{11} + N_{10}}{N_{11} + N_{01}} \tag{21}$$

The observed quantities N_{11}, N_{10} and N_{01} for each magnitude class and the respective ratios H_1/H_2 are given in Table XX. To derive the mean

Table XX

m	$N_{11} + N_{10}$	$N_{11} + N_{01}$	$\frac{H_1}{H_2}$	$\overline{m}$	$\frac{H_1}{H_2}$
1	0	0	—	2.00	1.73
2	3	1	1.73	2.75	1.48
3	8	4	1.41	3.22	1.35
4	5.5	4	1.17	4.33	1.23
5	16.5	12	1.17	5.58	1.41
6	53.5	22	1.56	6.57	1.32
7	127	79.5	1.26	7.44	1.21
8	196	157.5	1.12	8.15	1.09
9	165.5	17.5	0.98	8.69	1.05
10	56	50.5	1.05	9.26	1.00
11	2	2	1.00	10.04	1.05
1—11	633	504	1.12	8.00	1.12

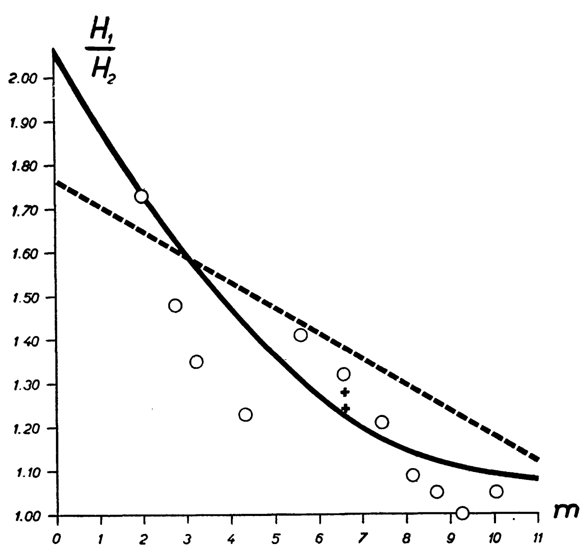

Figure 13.

ratio for each magnitude, groups have been formed by summing the three rows following one another ($m - 1$, m, $m + 1$) and the obtained values of H_1/H_2 have been correlated with the average magnitudes of the groups m. The results are plotted in Figure 13, where the relation derived previously by Bacharev [9] is indicated by the dashed line and the results of Teichgraeber [8] by the two crosses. The dispersion of the points is considerable and corresponds to the discrepancies of many tens of percentage in the real lengths of visible paths. The systematic defect of H_1/H_2 for the lowest magnitudes is the most striking. The explanation of this defect consists in erroneous classifying the faintest meteors for which the points of appearance and disappearance cannot be observed with certainty. It is reasonable to suppose that most frequently the point of appearance will remain unnoticed and that the type 10 will be erroneously classified as 00: hence the uncertainty in the classification would tend to decrease the computed values of H_1/H_2. The uncertainty furthermore increases with the magnifying power of the instrument. For our observations, where the magnification was relatively high (25-fold), a systematic underestimation of H_1/H_2 is expected to occur, and it really does occur.

Regarding the results of the I[st] paragraph (p. 73) we may try to derive improved values of H_1/H_2 by combining the statistics of types with the statistics of angular lengths. As a satisfactory approximation the following relation may be adopted,

$$\frac{H_1 - H_2}{H_1 + H_2} = a\lambda \tag{22}$$

or

$$\frac{H_1}{H_2} = \frac{1 + a\lambda}{1 - a\lambda} \tag{23}$$

where a is a constant which may be determined from the statistics of types at higher magnitudes where the errors of classification are negligible. Using the statistics of types for $m < 8$ we obtain a set of conditional equations of the form

$$a = \frac{1}{\lambda} \cdot \frac{\frac{H_1}{H_2} - 1}{\frac{H_1}{H_2} + 1} \tag{24}$$

Inserting the quantities of Table XV and XX into (24) we obtain:

$$a = 0.051 \pm 0.006 \tag{25}$$

Substituting $a = 0.051$ and λ of Table XVI into (23) the improved dependence of H_1/H_2 upon m is found. This dependence, evaluated in Table XXI, is represented by the full line in Figure 13.

Table XXI

m	$\frac{H_1}{H_2}$	m	$\frac{H_1}{H_2}$
0	2.06	6	1.27
1	1.89	7	1.20
2	1.73	8	1.15
3	1.59	9	1.11
4	1.47	10	1.09
5	1.36	11	1.08

It is seen that there is a satisfactory coincidence between our results and those secured by Bacharev except the pronounced non-linearity of the correlation deduced from our data.

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М. КРЕСАКОВА — Л. КРЕСАК

ОБ АКТИВНОСТИ ТЕЛЕСКОПИЧЕСКИХ МЕТЕОРОВ И НЕКОТОРЫХ РОДСТВЕННЫХ ПРОБЛЕМАХ

Изменения часового числа телескопических метеоров можно разделить на две части:

1. Периодические суточные и годовые вариации, которые находятся в связи с изменениями положения апекса.

2. Неправильные изменения, вызванные наличием метеорных потоков.

Величина периодической вариации раньше считалась доказательством большой гелиоцентрической скорости и межзвездного происхождения спорадических метеоров. В настоящее время благодаря употреблению прямых методов определения скорости метеоров (фотографии и радара) доказано противное; объяснение надо искать в изменении кинетической энергии при различных геоцентрических скоростях и прежде всего в отличии числа прямых и ретроградных орбит. Знание характера изменения второй составляющей важно для вопросов происхождения и развития метеорных потоков. Кажется, что функция светимости в разных потоках отлична от функции светимости спорадических метеоров и что количество слабых метеоров в потоках сравнительно незначительно.

Задачей этой работы было исследовать ход изменений часовых чисел на основании статистических наблюдений телескопических метеоров. Для этого был использован ряд наблюдений, произведенных в Скалнате Плесо в 1946—1953 гг. при помощи бинокля Сомет—Бинар 25×100. Было произведено 1126 наблюдений, при которых было зарегистрировано 3925 телескопических метеоров в течение 1117 часов времени наблюдений. У 1653 метеоров были установлены и некоторые более подробные данные, которые были использованы для определения функции светимости, зависимости между средней длиной и яркостью и отношения высот начала и конца видимого пути для разных яркостей. Отсюда вытекают следующие заключения:

1. Зависимость между часовым числом и высотой апекса у телескопических метеоров не столь выразительна, как у визуальных; она соответствует эффективной гелиоцентрической скорости $c = 3{,}9$. Этот факт можно объяснить двумя способами: либо при селекции по скоростям происходит кажущееся снижение концентрации радиантов вблизи апекса, либо у телескопических метеоров относительное число прямых орбит, больше чем у визуальных.

2. После исключения влияния положения апекса у телескопических метеоров имеется известная годовая вариация, в основном подобная вариации визуальных метеоров, выведенной Гофмейстером для северного полушария. Сравнительное повышение телескопической активности появляется только в конце сентября и в начале октября. Характер орбит визуальных и телескопических метеоров в таком случае не может существенно различаться.

3. Между телескопическими метеорами имеются метеорные потоки, но меньше чем среди визуальных. Часовое число потоков превышает часовое число спорадических метеоров не более, чем в течение 10 ночей ежегодно.

4. Неожиданные повышения часового числа телеметеоров наблюдались при долготах Солнца около 131°, 158°, 184°, 194°, 248° и 257°. В последнем случае может быть в связи с ви-

зуальным потоком Геминид; остальные известные потоки не проявляются заметно в статистике телескопических метеоров.

5. Небольшое количество телескопических метеоров в визуально интенсивных потоках можно объяснить влиянием эффекта Пойнтинг—Робертсона, равно как и сдвиг положения максимума телескопических Геминид по сравнению с визуальными.

6. Вблизи границы телескопических и визуальных метеоров функция светимости характеризуется постоянным отношением количества 1 : 2,45 на одну звездную величину. Быстрое понижение, которое начинается между 8 и 9 величиной, кажется отчасти реальным.

7. В результате обработки изучена зависимость между средными угловыми длинами, относительными высотами возгоряния и потухания метеоров и их яркостью. Эти зависимости не являются линеарными, как показывали некоторые существующие роботы.

MARGITA KRESÁKOVÁ — ĽUBOR KRESÁK

O AKTIVITE TELESKOPICKÝCH METEOROV A O NIEKTORÝCH PRÍBUZNÝCH PROBLÉMOCH

Zmeny frekvencie teleskopických meteorov možno rozdeliť na dve zložky:

1. Periodické variácie, súvisiace so zmenami polohy apexu (obsahujú dennú a ročnú variáciu v užšom zmysle).

2. Nepravidelné zmeny, spôsobené výskytom meteorických rojov.

Veľkosť prvej zložky sa prv pokladala za dôkaz vysokej heliocentrickej rýchlosti a interstelárneho pôvodu sporadických meteorov. Dnes, keď sa použitím priamych metód (fotografie a radaru) dokázal opak, treba hľadať vysvetlenie v spôsobe premeny kinetickej energie pri rôznych geocentrických rýchlostiach a najmä v pomernom zastúpení priamych a retrográdnych dráh. Podiel druhej zložky je podstatný pre otázky vzniku a vývoja meteorických rojov. Zdá sa, že funkcia jasnosti v rôznych rojoch je iná ako medzi sporadickými meteormi, a že počet slabých meteorov v rojoch je pomerne malý.

Hlavnou úlohou tejto práce bolo preskúmať priebeh zmien frekvencie na štatistických pozorovaniach teleskopických meteorov. K tomu bol použitý dlhý rad pozorovaní, vykonaných v rokoch 1946—1953 na observatóriu na Skalnatom Plese binokulárnym ďalekohľadom Somet-Binar 25×100. Rad obsahuje 1126 pozorovaní, pri ktorých bolo v 1117 hodinách čistého času zachytených 3925 teleskopických meteorov. Pre 1653 meteorov boli k dispozícii aj niektoré podrobnejšie údaje, ktoré sa použili na určenie funkcie jasnosti, závislosti priemernej uhlovej dĺžky od veľkosti a pomeru výšok začiatku a konca viditeľnej dráhy pre rôzne veľkosti. Z podrobného spracovania vyplynuli tieto hlavné závery:

1. Závislosť frekvencie od výšky apexu nie je pre teleskopické meteory taká význačná ako pre vizuálne meteory; zodpovedá efektívnej heliocentrickej rýchlosti 3,9. Tento fakt možno vysvetliť dvojakým spôsobom: alebo selekcia podľa rýchlostí zdanlivo znižuje koncentráciu radiantov v blízkosti apexu, alebo medzi teleskopickými meteormi prevládajú priame dráhy viac ako medzi vizuálnymi.

2. Aj po vylúčení vplyvu polohy apexu teleskopické meteory vykazujú určitú ročnú variáciu, celkom zhodnú s variáciou vizuálnych meteorov, ktorú odvodil Hoffmeister pre severnú pologuľu. Pomerné zvýšenie teleskopickej činnosti sa prejavuje iba koncom septembra a začiatkom októbra. Medzi usporiadaním dráh vizuálnych a teleskopických meteorov pozdĺž dráhy Zeme nemôže byť teda nijaký podstatný rozdiel.

3. Aj medzi teleskopickými meteormi sa vyskytujú meteorické roje, ale oproti vizuálnym v zmenšenej miere. Frekvencia rojov nepresahuje frekvenciu sporadických meteorov vo viac ako 10 nociach ročne.

4. Náhle zvýšenia frekvencie teleskopických meteorov boli pozorované najmä pri dĺžkach Slnka okolo 131°, 158°, 184°, 194°, 248° a 257°. Posledné z nich môže súvisieť s vizuálnym rojom Geminíd; ostatné známe roje sa v štatistike teleskopických meteorov znateľne neprejavujú.

5. Malý počet teleskopických meteorov vo vizuálne silných rojoch možno vysvetliť pôsobením Poyntig—Robertsonovho efektu; podobne tiež posunutie maxima teleskopických Geminíd oproti vizuálnym.

6. V blízkosti rozhrania teleskopických a vizuál-

nych meteorov je funkcia jasnosti charakterizovaná stálym pomerom početnosti 1 : 2,45 na jednu hviezdnu triedu. Pokles, ktorý začína medzi 8. a 9. veľkosťou, zdá sa byť sčasti reálny.

7. Z pozorovaní bola určená závislosť medzi priemernou uhlovou dĺžkou, resp. pomerom výšok začiatkov a koncov svetelných dráh meteorov v atmosfére a ich jasnosťou. Táto závislosť je nápadná a plynulá; nie je však lineárna ako ukazovali niektoré doterajšie práce.