with a horizontal stretch (minimum) of λ_s, the quick rise from 1897 to 1906 corresponds to a decrease of λ_s. The effect of absorption cannot have another period than 18.03 years, while in the observed fluctuations periods of different length are certainly present.

It appears to me, therefore, that so far we have no reason to consider the existence of a sensible absorption of gravitation as proved, or even as probable.

(To be continued).

Astronomy. — *"On Absorption of Gravitation and the moon's longitude"*. By Prof. Dr. W. DE SITTER. Part II.

(Communicated in the meeting of December 28, 1912).

The conclusions derived in the first part of this paper are entirely confirmed by the second computation, which was already referred to in that part, and which was based on a different hypothesis regarding the distribution of mass in the body of the earth. I now assumed a core of density $\delta'_2 = 20$ and radius $R'_1 = 0.55\ R$, surrounded by a mantle of density $\delta'_1 = 2.8$ [1]). In the same way as before, I put, for $T_0 < 93.5$

$$J_0' = 84.7 \left(\frac{T_0}{112}\right)^2,$$

and for $T_0 > 93.5$

$$J_0' = 84.7 \left\{ 7.1 \left(\frac{T_0}{112}\right)^2 - 4.27 \right\}.$$

The multiplier 100 has been replaced by $84.7 = 100\ \delta_1'/\delta_1$ in order to get the same value of q for both computations. The result of the introduction of this new distribution of mass instead of the formerly assumed one is to increase the amount of absorption for long eclipses and to diminish it for short eclipses. The ratio J_0'/J_0 varies from 0.51 to 1.25. It is smallest for those eclipses in which with WIECHERT's hypothesis the core also contributes to the absorption, while in the new hypothesis the ray of gravitation is situated entirely in the mantle. For the purpose of computation this ratio J_0'/J_0 was tabulated with the argument T_0. We have then

$$\delta n' = \frac{J_0'}{J_0}\ \delta n.$$

[1]) This hypothesis has been suggested by recent investigations by Mr. GUTENBERG, which were kindly communicated to me by Dr. BOTTLINGER. Mr. GUTENBERG finds that the real distribution of mass is included between the limits given by $\delta'_2 = 20$, $\delta'_1 = 2.8$ and $\delta_2' = 8$, $\delta'_1 = 4.4$. It being my intention to investigate the effect of a change in the function J_0, I purposely took the upper limit, which differs most from WIECHERT's assumption.

With this value of $\delta n'$ the computation was then carried out in exactly the same way as with δn. Notwithstanding the considerable difference between the functions J_0' and J_0 the general character of the results of the two computations is the same.

The non-periodic part of the perturbation in longitude derived from the new computation is given in Table IV, which is entirely similar to Table I of Part I. We now find $\Delta_0 \nu' = -230$, $\Delta_0 \lambda' = +2939$. Neglecting the term $-\frac{1}{2} p^2 \Delta_0 \nu'$ and causing the perturbation to vanish for 1721 and 1865 by an appropriate choice of the constants of integration, we find the values given under the heading λ'_1. If the term containing $\Delta_0 \nu'$ is added, we get the value λ'_2. The general

TABLE IV.

Year	Saros	$\Delta n'$	$\Delta \lambda'$	$\Delta_1 \nu'$	$\Delta_1 \lambda'$	λ_1'	λ_2'
1703.0						+ 747	− 288
	I	−15.2	+1727	−334	−1212		
1721.0						0	0
	II	−10.4	+2318	−156	− 621		
1739.1						− 490	+ 315
	III	−21.0	+2346	−550	− 593		
1757.1						−1180	+ 272
	IV	+ 2.8	+3300	+334	+ 361		
1775.1						−1322	+ 403
	V	−12.3	+3141	−227	+ 202		
1793.1						−1361	+ 476
	VI	− 9.3	+3380	−115	+ 441		
1811.2						−1388	+ 337
	VII	− 1.0	+3466	+193	+ 527		
1829.2						−1444	− 64
	VIII	+14.0	+3896	+751	+ 957		
1847.2						− 877	− 72
	IX	− 1.9	+3452	+160	+ 513		
1865.3						− 3	− 3
	X	− 9.7	+3120	−130	+ 181		
1883.3						+ 699	− 336
	XI	−19.6	+2494	−498	− 445		
1901.3						+ 645	−1655
	XII	+ 9.2	+2630	+572	− 309		
1919.4						+ 229	−3566

character of the perturbation is very similar to that of the first computation. But the correspondence with the "great fluctuation", which was apparent in the first computation, does not exist here.

In the periodic part the agreement between the results of the two computations is even more complete.

With reference to the reliability of these results it must be remarked that the function J_0' has a wider range of variation depending on T_0 than J_0, and consequently the possible error arising from the fact that T_0 is only known to whole minutes is in the second computation much larger than in the first. Accordingly we find that the values of $\Delta_0 v'$ in the second computation are considerably larger than the corresponding values of $\Delta_0 v$ in the first computation. Also the values of $\Delta_1 \lambda'$ are larger than those of $\Delta_1 \lambda$. We are thus led to the same conclusion as before, viz: the reality of the non-periodic part of the perturbation is not assured, and the only thing that can be asserted with certainty is that the non-periodic part cannot have any considerable irregularities and that no other periods are possible than the Saros of 18.03 years.

The following tables contain the principal quantities occurring in the computations. Table V gives for each eclipse the values of T_0, l_1, l_1' and those of δn and $\delta n'$ computed by the formula (10). The first column of the table contains the time t counted in synodic months from the beginning of the Saros. The time $t = 223$ of any Saros is, of course, identical to the time $t = 0$ of the next Saros. The arrangement of the eclipses in groups of six is very clearly shown. The several groups begin at

$$t = 0, \quad 41, \quad 88, \quad 129 \text{ and } 176$$

and end at

$$t = 30. \quad 77, \quad 118, \quad 165 \text{ and } 212.$$

Table VI contains the purely periodic part of the perturbation λ_s and λ_s' according to the two computations. The similarity between the different Saros-periods is very striking. In the mean motion this similarity is even more apparent than in the longitude. The mean motion is not contained in the table. but can easily be derived from the longitudes, as it is the difference of two successive values of λ_s (or λ'_s). We see from this table that in the first computation the amplitude of the periodic part is fairly constant for the first eight periods and begins to increase after the eighth Saros. The difference between the extreme values of λ_s oscillates between 700 and 830 in the periods I to VIII, and then gradually increases up to about 1200 for the Saros XII. In the second computation the difference between the extreme values of λ'_s is more constant and varies between about 950 and 1100.

The remarkable agreement between the results of the two computations justifies the expectation that the general character of the perturbations in longitude produced by an absorption of gravitation will be sensibly the same for any assumed distribution of density within the body of the earth. which is at all within the limits of probability. The conclusions arrived at in Part I are thus not restricted to the particular hypothesis which was there introduced. but have a much wider bearing.

TABLE V.

t	Saros I						Saros II					
	Year	T_0	l_1	l'_1	δn	$\delta n'$	Year	T_0	l_1	l'_1	δn	$\delta n'$
		m	°	°				m	°	°		
0	1703.0	83	223.2	4	+ 58.2	+ 34.9	1721.0	83	220.4	14	+ 55.5	+ 33.3
6	03 5	108	18.1	178	− 49.2	− 55.1	21.5	105	15.2	189	− 37.0	− 37.7
12	04.0	112	173.0	353	− 26.8	− 33.5	22.0	112	170.1	4	− 36.1	− 45.1
18	04.5	102	327.9	167	+ 71.0	+ 64.6	22.5	105	325.0	178	+ 84.0	+ 85.7
24	04.9	78	122.8	342	− 56.3	− 37.2	23.0	79	119.9	353	− 60.6	− 39.4
30												
41	1706.3	74	201.6	117	+ 20.4	- 15.5	1724.4	65	198.8	128	+ 12.3	+ 10.5
47	06.8	84	356.6	292	+ 7.2	+ 4.2	24.8	82	353.7	302	+ 10.0	+ 6.1
53	07.3	112	151.5	106	− 90.6	−113.2	25.3	111	148.6	117	− 97.1	−118.5
59	07.8	112	306.4	281	+153.0	+191.2	25.8	112	303.5	292	+159.5	+199.3
65	08.3	76	101.3	95	− 55.2	− 38.6	26.3	82	98.4	106	− 73.9	− 45.1
71	08.7	72	256.2	270	+ 43.0	+ 34.8	26.8	76	253.4	281	+ 54.5	+ 38.1
77												
88	1710.1	93	335.1	45	+ 43.4	+ 22.1	1728.2	92	332.2	56	+ 46.2	+ 24.0
94	10.6	91	130.0	220	− 84.3	− 44.7	28.6	85	127.1	230	− 70.7	− 41.0
100	11.1	111	284.9	34	+182.6	+222.8	29.1	111	282.0	45	+186.5	+227.5
106	11.6	110	79.8	209	−172.5	−205.3	29.6	111	76.9	220	−174.1	−212.4
112	12.1	58	234.7	23	+ 23.8	+ 20.2	30.1	59	231.9	34	+ 24.0	+ 20.4
118	12.5	49	29.6	198	− 8.8	− 7.5	30.6	63	26.8	209	− 12.6	− 10.7
124												
129	1713.4	63	313.6	158	+ 20.9	+ 17.8	1731.5	48	310.7	169	+ 13.2	+11.2
135	13.9	71	108.5	333	− 41.3	− 34.3	32.0	70	105.6	344	− 40.6	− 34.1
141	14.4	111	263.4	148	+182.9	+223.1	32.4	110	259.5	158	+177.7	+211.5
147	14.9	112	58.3	322	−159.6	−199.5	32.9	112	55.4	333	−154.7	−193.4
153	15.4	82	213.2	137	+ 44.0	+ 26.8	33.4	90	210.3	148	+ 55.2	+ 29.8
159	15.9	90	8.1	311	− 11.1	− 6.0	33.9	90	5.2	322	− 6.8	− 3.7
165												
176	1717.2	83	87.0	86	− 78.0	− 46.8	1735.3	78	84.0	97	− 61.2	− 40.4
182	17.7	83	241.9	261	+ 69.4	+ 41.6	35.8	77	239.0	272	+ 51.5	+ 34.5
188	18.2	112	36.8	76	−114.8	−143.5	36.2	112	33.9	86	−106.7	−133.4
194	18.7	112	191.7	250	+ 34.9	+ 43.6	36.7	112	188.8	261	+ 24.6	+ 30.8
200	19.2	76	346.5	65	+ 10.5	+ 7.4	37.2	79	343.7	76	+ 15.1	+ 9.8
206	19.7	67	141.4	239	− 24.2	− 20.6	37.7	76	138.6	250	− 40.0	− 28.0
212												

TABLE V (*Continued*).

t	Saros III						Saros IV					
	Year	T_0	l_1	l'_1	δn	δn	Year	T_0	l_1	l'_1	δn	$\delta n'$
		m	°	°				m	°	°		
0	1739.1	82	217.5	25	+ 50.7	+ 30.9	1757.1	80	214.6	35	+ 43.2	+ 27.6
6	39.6	103	12.4	200	— 27.8	— 26.4	57.6	98	9.5	211	— 17.2	— 12.7
12	40.0	112	167.3	14	— 45.1	— 56.4	58.1	112	164.4	25	— 54.1	— 67.6
18	40.5	107	322.2	189	+ 95.8	+104.4	58.6	110	319.3	200	+111.0	+132.1
24	41.0	80	117.1	4	— 64.6	— 47.7	59.0	80	114.3	14	— 65.7	— 42.0
30												
41	1742 4	52	196.0	139	+ 6.8	+ 5.8	1760.4	31	193.2	148	+ 2.0	+ 1.7
47	42.9	79	350.9	313	+ 11.5	+ 7.5	60.9	77	348.1	323	+ 12.9	+ 8.6
53	43.4	110	145.8	128	—102 9	—122.5	61.4	110	143.0	139	—110.7	- 131.7
59	43.8	112	300.7	302	+165.3	+206.6	61.9	112	297.9	313	+170.5	+213.1
65	44.3	88	95.6	117	— 93.2	- 51.3	62.4	94	92.8	128	—114.5	— 60.7
71	44.8	80	250.5	292	+ 65.7	+ 42.0	62.8	82	247.7	302	+ 71.8	+ 43.8
77												
88	1746.2	9 1	329 4	67	+ 48.5	+ 25.7	1764.2	88	326.5	76	+ 47.0	+ 25.8
94	46.7	76	124 3	241	— 48.4	— 33.9	64.7	70	121.5	251	— 35.7	— 30.0
100	47.2	111	279.2	56	+186.3	+227.3	65.2	112	276.4	66	+191.4	+239.2
106	47 6	112	74.1	230	—175.3	219.1	65.7	112	71.3	240	—172.5	—215.6
112	48.1	61	228.9	45	+ 24.8	+ 21.1	66.1	64	226.2	56	+ 26.2	+ 22.3
118	48.6	73	23.8	220	— 15.9	— 12.6	66 6	80	21.1	230	— 20.5	— 13.1
124												
129	1749.5	26	307.9	180	+ 4.7	+ 4.0						
135	50.0	71	102.8	355	— 42.1	— 34.9	1768.0	70	100.0	5	— 41.3	— 34.7
141	50.5	108	257.6	169	+168.9	+189.2	68.5	105	254.9	179	+153.9	+157.0
147	51.0	112	52.5	344	—149.7	—187.1	69.0	112	49.8	354	—144.7	—180.9
153	51.4	96	207.4	158	+ 61.3	+ 38.6	69.5	101	204.7	168	+ 63.8	+ 55.5
159	51.9	91	2.3	333	— 2.3	— 1.2	70.0	91	359.6	343	+ 1.8	+ 1.0
165												
17[illegible]	1753 3	73	81.2	108	— 44.6	— 35.2	1771.3	67	78.5	118	— 34.4	— 29.2
182	53.8	72	236.1	283	+ 37.3	+ 30.2	71.8	67	233.4	293	+ 29.8	+ 25.3
188	54.3	112	31.0	97	98.2	—122.8	72.3	112	28.3	107	— 90.1	—112.6
194	54.8	112	185.9	272	+ 14.4	+ 18.0	72.8	111	183.2	282	+ 4.6	+ 5.6
200	55.2	84	340.8	87	+ 22.5	+ 13.3	73.3	88	338.1	96	+ 29.8	+ 16.4
206	55.7	82	135 8	261	— 56.6	— 34.5	73.7	88	133.0	271	— 75.2	41.4
212												

TABLE V (*Continued*).

t	Saros V						Saros VI					
	Year	T_0	l_1	l'_1	δn	$\delta n'$	Year	T_0	l_1	l'_1	δn	$\delta n'$
		m	°	°				m	°	°		
0	1775.1	79	211.9	46	+ 38.7	+ 25 2	1793.1	75	208 9	57	+ 28.6	+ 20.9
6	75.6	93	6.8	220	− 9.6	− 4.9	93.6	89	3.9	231	− 3.3	− 1.8
12	76.1	112	161.7	35	− 62.4	− 78.0	94.1	112	158.8	46	− 71.3	− 89.1
18	76.6	110	316.6	210	+118.3	+140.8	94 6	112	313.7	220	+131.2	+164.0
24	77.1	82	111.4	24	− 73.6	− 44.9	95.1	83	108.6	35	− 77.3	− 46.4
30	77.6	39	266.3	199	+ 11.6	+ 9.9	95.6	58	263.5	210	+ 26.1	+ 22.2
41												
47	1778.9	77	345 3	334	+ 15.3	+ 10.3	1797 0	76	342.4	345	+ 16.8	+ 11.8
53	79.4	107	140.1	149	−109.8	−119 7	97.4	104	137.3	159	−107.7	−105.5
59	79.9	112	295 0	323	+175.5	+219.4	97.9	111	292.2	334	+176.1	+214.8
65	80.4	98	89.9	138	−129.4	− 95.8	98.4	102	87.1	148	−144.8	−131.8
71	80.9	84	244.8	312	+ 77.4	+ 45.7	98.9	85	242.0	323	+ 78.9	+ 45.8
77												
88	1782.2	85	323.7	87	+ 45.0	+ 26.1	1800.3	80	320.9	98	+ 38.4	+ 24.6
94	82.7	62	118 6	262	− 28.5	− 24.2	00.8	54	115.8	273	− 22 7	− 19.3
100	83.2	112	273.5	76	+191.9	+239 9	01.2	112	270.7	87	+192.2	+240.2
106	83.7	112	68.4	251	−169.3	−211.6	01.7	111	65.6	262	−162.6	−198.4
112	84.2	70	223.3	66	+ 30.2	+ 25.4	02.2	73	220.5	76	+ 33.1	+ 26.1
118	84.7	86	18 3	240	− 22.6	− 12.9	02.7	91	15.4	251	− 22.5	− 11.9
129												
135	1786.0	70	97.1	15	− 41.4	− 34.8	1804.1	69	94.3	26	− 40.3	− 34.3
141	86.5	101	252.0	190	+136 7	+118.9	04.6	96	249.2	201	+116.6	+ 73.3
147	87.0	112	46.9	5	−138.7	−173.4	05.0	112	44.1	14	−132.6	−165.8
153	87.5	105	201.8	179	+ 62.0	+ 63.2	05.5	108	199.0	190	+ 58.2	+ 65.2
159	88.0	91	356.8	354	+ 6.1	+ 3.2	06.0	91	353.8	4	+ 10.7	+ 5.7
165												
176	1789.4	58	75.6	129	− 25.4	− 21.6	1807.4	44	72.8	139	− 14.7	− 12.5
182	89.8	62	230.5	303	+ 24 9	+ 21.2	07.9	58	227.7	313	+ 20.9	+ 17.8
188	90.3	111	25.4	118	− 79.5	− 97.0	08.4	110	22.5	128	− 69.0	− 82.1
194	90.8	110	180.3	293	− 5.2	− 6.2	08.8	110	177.4	303	− 14.6	− 17.4
200	91.3	91	335.2	107	+ 37.8	+ 20.0	09.3	95	332.3	118	+ 48.3	+ 28.0
206	91.8	91	130.1	282	− 87.8	− 46.5	09.8	94	127.2	292	−100.7	− 53.4
212					6							

TABLE V (*Continued*).

t	Saros VII						Saros VIII					
	Year	T_0	l_1	l'_1	δn	$\delta n'$	Year	T_0	l_1	l'_1	δn	$\delta n'$
0	1811.2	72^m	206.1°	67°	+ 22.2	+ 18.0	1829.2	67^m	203.3°	77°	+ 16.5	+ 14.0
6	11.7	83	1.0	241	+ 1.1	+ 0.7	29.7	77	358.2	252	+ 3.7	+ 2.5
12	12.2	112	155.9	56	− 80.2	−100.3	30.2	111	153.1	67	− 86.1	−105.0
18	12.6	112	310.8	230	+138.6	+173.2	30.7	112	308.0	241	+145.7	+182.2
24	13.1	86	105.7	45	− 87.9	− 50.1	31.2	87	102.9	56	− 92.3	− 51.7
30	13.6	67	260.7	220	+ 34.8	+ 29.6	31.6	75	257.8	230	+ 50.1	+ 36.6
41												
47	1815.0	76	339.5	355	+ 19.1	+ 13.4	1833.0	75	336.7	5	+ 19.8	+ 14.5
53	15.5	100	134.4	169	−101.6	− 84.3	33.5	94	131.6	180	− 88.6	− 47.0
59	16.0	111	289.3	344	+180.1	+219.7	34.0	111	286.5	355	+183.3	+223.6
65	16.4	106	84.2	158	−158.7	168.2	34.5	109	81.4	169	−170.0	−195.5
71	16.9	87	239.2	333	+ 83.7	+ 46.9	35.0	87	236.2	344	+ 81.7	+ 45.8
77							35.4	35	31.1	158	− 4.8	− 4.1
83												
88	1818.3	74	318.0	108	+ 29.5	+ 22.4	1836.3	67	315.2	119	+ 22.8	+ 19.4
94	18.8	44	112.9	283	− 15.4	− 13.1	36.8	39	110.1	293	11.9	− 10.1
100	19.3	112	267.8	97	+191.7	+239.6	37.3	111	264.9	108	+186.9	+228.0
106	19.8	110	62.7	272	−155.4	−184.9	37.8	110	59.8	283	−151.3	−180.0
112	20.2	78	217.6	86	+ 41.8	+ 27.6	38.3	83	214.7	97	+ 49.1	+ 29.5
118	20.7	94	12.5	261	− 19.4	− 10.3	38.8	97	9.6	272	− 15.5	− 10.7
129												
135	1822.1	68	91.3	36	− 39.1	− 33.2	1840.1	67	88.5	47	36.9	− 31.4
141	22.6	90	246.3	211	+ 93.1	+ 50.4	40.6	83	243.4	221	+ 69.2	+ 41.5
147	23.1	112	41.2	25	−126.0	−157.5	41.1	112	38.3	36	−119.0	−148.8
153	23.6	110	196.1	200	+ 50.6	+ 60.2	41.6	111	193.2	211	+ 41.2	+ 50.3
159	24.0	92	351.0	14	+ 15.6	+ 8.1	42.1	92	348.1	25	20.2	+ 10.5
165	24.5	45	145.9	189	− 9.2	− 7.8	42.6	61	143.1	200	− 18.7	− 15.9
171												
176	1825.4	18	69.8	149	− 1.9	− 1.6						
182	25.9	54	224.8	324	+ 17.9	+ 15.2	1843.9	51	221.9	335	+ 14.9	+ 12.7
188	26.4	110	19.7	139	− 60.2	− 71.6	44.4	107	16.8	149	− 44.5	− 48.5
194	26.9	110	174.6	313	− 23.7	− 28.2	44.9	109	171.7	324	− 32.3	− 37.1
200	27.4	99	329.5	128	+ 60.4	+ 47.7	45.4	103	326.6	139	+ 74.3	+ 70.6
206	27.8	95	124.4	302	−107.9	− 62.6	45.9	97	121.6	313	−118.6	− 81.9
212												

TABLE V (*Continued*).

t	Saros IX						Saros X					
	Year	T_0	l_1	l'_1	δn	$\delta n'$	Year	T_0	l_1	l'_1	δn	$\delta n'$
		m	°	°				m	°	°		
0	1847.2	60	200.5	88	+ 11.7	+ 9.9	1865.3	51	197.7	99	+ 7.6	+ 6.5
6	47.7	72	355.4	263	+ 4.8	+ 3.9	65.8	65	352.6	274	+ 5.3	+ 4.5
12	48.2	110	150.3	77	— 92.1	—119.6	66.2	110	147.4	88	— 99.8	118.8
18	48.7	112	305.2	252	+152.4	+190.5	66.7	110	302.3	263	+152.3	+181.2
24	49.2	90	100.1	67	—103.5	— 55.9	67.2	92	97.2	77	—110.5	— 57.2
30	49.7	82	255.0	241	+ 71.9	+ 43.9	67.7	88	252.1	252	+ 90.4	+ 49.7
41												
47	1851.0	74	333.8	16	+ 20.6	+ 15.7	1869.1	74	331.0	26	+ 22.4	+ 17.0
53	51.5	89	128.8	191	— 78.3	— 42.3	69.6	80	125.9	201	— 56.1	— 35.9
59	52.0	111	283.7	5	+186.0	+226.9	70.0	111	280.8	16	+188.1	+229.5
65	52.5	110	78.6	180	—171.2	—203.7	70.5	111	75.7	191	—172.2	—210.1
71	53.0	87	233.5	355	+ 79.6	+ 44.6	71.0	88	230.6	5	+ 79.6	+ 43.8
77	53.5	53	28.4	169	— 9.9	— 8.4	71.5	65	25.6	180	— 13.2	— 11.2
83												
88	1854.4	58	312.3	130	+ 18.1	+ 15.4	1872.4	42	309.5	140	+ 9.8	+ 8.3
94	54.8	30	107.3	304	— 7.0	— 6.0	72.9	21	104.4	314	— 4.0	— 3.4
100	55.3	110	262.2	119	+181.7	+216.2	73.4	109	259.3	129	+176.3	+202.7
106	55.8	110	57.1	293	147.4	—175.4	73.8	109	54.2	303	—139.6	—160.5
112	56.3	89	212.0	108	+ 58.0	+ 31.3	74.3	93	209.1	119	+ 61.1	+ 31.2
118	56.8	99	6.9	283	— 10.6	— 8.4	74.8	102	4.1	293	— 5.2	— 4.7
129												
135	1858.2	65	85.8	58	— 34.5	— 29.3	1876.2	62	82.9	68	— 31.0	— 26.4
141	58.6	75	240.7	232	+ 45.2	+ 33.0	76.7	64	237.8	242	+ 28.0	+ 23.8
147	59.1	111	35.6	47	—109.7	—133.8	77.2	111	32.7	57	—102.2	—124.7
153	59.6	112	190.5	221	+ 31.9	+ 39.9	77.6	111	187.6	231	+ 20.8	+ 25.4
159	60.1	92	345.4	36	+ 24.4	+ 12.7	78.1	94	342.5	46	+ 30.8	+ 16.3
165	60.6	74	140.3	211	— 32.7	— 24.9	78.6	83	137.4	220	— 55.5	— 33.3
176												
182	1862.0	48	219.2	346	+ 12.9	+ 11.0	1880.0	45	216.2	356	+ 10.4	+ 8.8
188	62.4	104	14.1	160	— 36.5	— 35.8	80.5	102	11.2	170	— 27.0	— 24.6
194	62.9	109	169.0	335	— 40.6	— 46.7	81.0	108	166.1	345	— 48.3	— 54.1
200	63.4	105	323.9	149	+ 84.5	+ 86.2	81.4	108	321.0	159	+ 99.0	+110.9
206	63.9	98	118.7	324	—125.4	— 92.8	81.9	99	115.9	334	—132.1	—104.4
212												

TABLE V (*Concluded*).

t	Saros XI						Saros XII					
	Year	T_0	l_1	l'_1	∂n	$\partial n'$	Year	T_0	l_1	l'_1	∂n	$\partial n'$
		m	°	°				m	°	°		
0	1883.3	35	194.7	109	+ 2.9	+ 2.5						
6	83 8	58	349.7	284	+ 5.4	+ 4.6	1901.8	54	346.8	294	+ 5.9	+ 5.0
12	84 3	109	144.6	98	−104.5	−120.2	02.3	107	141.7	109	−106 2	−115.8
18	84 8	110	299.5	273	+157.9	+187.9	02 8	110	296.6	284	+163.6	+194.5
24	85 2	96	94.4	87	−126.2	− 79.5	03.3	99	91.5	98	−136.4	−107.8
30	85 7	92	249.3	262	+103.5	+ 53 8	03.8	95	246.5	273	+112.7	+ 65.3
41												
47	1887.1	72	328.2	37	+ 21.7	+ 17.6	1905.1	71	325.4	48	+ 21.6	+ 17.9
53	87 6	71	123 1	212	− 35 2	− 29.2	05.6	59	120.3	222	− 24 8	− 21.1
59	88.1	111	278.0	26	+189.8	+231 5	06.1	111	275.2	37	+191 0	+233.0
65	88.6	112	72.9	201	−172.8	−216 0	06.6	112	70.1	212	−169.3	−211.6
71	89.0	88	227 8	15	+ 76.9	+ 42 3	07.1	88	225.0	26	+ 73.8	+ 40.6
77	89.5	75	22.7	190	− 17.8	− 13.0	07 6	84	19.9	201	− 24.1	− 14.2
83												
88	1890.4	11	306.7	150	+ 0.8	+ 0.7						
94	90 9	11	101.6	325	− 1.0	− 0 8						
100	91.4	*107*	256.5	139	+165.4	*+180.3*	*1909.4*	*104*	253.7	150	+150.7	+147.7
106	91.9	109	51.4	314	−135.1	−155 3	09.9	108	48.6	325	−127.2	−142.5
112	92 4	98	206 3	129	+ 64.7	+ 47.9	10.4	103	203 5	139	+ 67.0	+ 63.6
118	92 8	102	1.1	303	+ 1.9	+ 1.7	10.9	103	358.4	314	+ 8.1	+ 7.7
129												
135	1894.2	57	80.1	78	− 25 7	− 21.8	1912 3	50	77.2	89	− 19.4	− 16.5
141	94 7	54	235 0	253	+ 19.8	+ 16 8	12 7	40	232.2	264	+ 10.4	+ 8.8
147	95 2	111	29 8	68	− 94 3	−115.0	13.2	110	27.1	78	− 84.9	−101.0
153	95.7	110	184.7	242	+ 10.1	+ 12.0	13 7	109	182.0	253	+ 0.4	+ 0.5
159	96 2	95	339 6	57	+ 36.8	+ 21 3	14.2	97	336.9	67	+ 44.0	+ 30.4
165	96 6	90	134 5	231	− 77.5	− 41.9	14.7	94	131.8	242	− 92.5	− 49.0
176												
182	1898.0	44	213 4	6	+ 9.7	+ 8.2	1916.1	42	210.7	17	+ 7 9	+ 6.7
188	98 5	97	8.3	181	− 16.5	− 11.4	16.5	92	5 6	192	− 8.8	− 4.6
194	99.0	108	163.2	356	− 56.7	− 63 5	17.0	108	160.5	6	− 64.2	− 71.9
200	99.5	110	318.1	170	+111.1	+132 2	17.5	111	315.4	181	+120.5	+147.0
206	1900.0	100	113.0	345	−1[illegible]8.4	−114.9	18.0	100	110.3	355	−140.5	−116.6
212	00.5	15	268.0	159	+ 1.9	+ 1 6	18.5	45	265.2	170	+ 15 4	+ 13.1
218												

TABLE VI.

t	Saros I			Saros II			Saros III			Saros IV		
	Year	λ_s	λ'_s	Year	λ_s	λ'_s	Year	λ_s	λ'_s	Year	λ_s	λ'_s
0	1703.0	0	0	1721.0	0	0	1739.1	0	0	1757.1	0	0
6	03.5	+ 9	— 12	21.5	— 3	— 29	39.6	— 11	— 32	57.6	— 16	— 61
12	04.0	— 31	— 79	22.0	— 43	— 96	40.0	— 50	— 91	58.1	— 49	—135
18	04.5	— 98	—179	22.5	—119	—208	40.5	—134	—206	58.6	—136	—277
24	04.9	— 94	—215	23.0	—111	—234	41.0	—122	—217	59 0	—112	—286
30		—147	—288		—164	—300		—175	—275		—154	—337
41	1706.3	—244	—422	1724 4	—261	—421	1742.4	—272	—381	1760.4	—231	—431
47	06.8	—276	—479	24.8	—302	—476	42.9	—318	—433	60 9	—271	—481
53	07.3	—301	—532	25.3	—333	—525	43.4	—353	—478	61.4	—298	—522
59	07.8	—417	—688	25.8	—460	—693	43.8	—491	—646	61.9	—436	—695
65	08.3	—380	—663	26.3	—418	—661	44.3	—463	—607	62.4	—403	—655
71	08.7	—398	—677	26.8	—450	—674	44 8	—528	—619	62 8	—485	—675
77		—373	—656		—438	—649		—528	—589		—495	—652
88	1710.1	—327	—617	1728.2	—416	—603	1746.2	—528	—534	1764.2	—513	—610
94	10.6	—258	—574	28 6	—357	—554	46.7	—479	—479	64.7	—476	—561
100	11.1	—274	—576	29.1	—369	—546	47.2	—479	—457	65.2	—475	—542
106	11.6	—107	—355	29.6	—195	—311	47 6	—292	—208	65.7	—282	—284
112	12.1	—113	—339	30.1	—195	—288	48.1	—281	—178	66.1	—262	—241
118	12.5	— 95	—303	30.6	—171	245	48.6	—245	—127	66 6	—216	—176
124		— 86	—274		—159	—212		—225	— 89		—190	124
129	1713.4	— 78	—250	1731.5	—149	—184	1749.5	208	— 57		—178	— 81
135	13.9	— 48	—203	32.0	—134	—140	50 0	—183	— 15	1768.0	—152	— 29
141	14.4	— 59	—191	32.4	—150	—130	50 5	—200	— 8	68.5	—167	— 12
147	14.9	+103	+ 44	32.9	+ 12	+ 91	51 0	— 48	+189	69.0	— 28	+162
153	15.4	+115	+ 80	33.4	+ 19	+119	51.4	— 46	+199	69.5	— 34	+155
159	15.9	+171	+143	33.9	+ 82	+177	51.9	+ 17	+247	70.0	+ 24	+204
165		+216	+200		+138	+231		+ 78	+294		+ 83	+254
176	1717.2	+299	+304	1735.3	+241	+333	1753.3	+190	+380	1771.3	+193	+346
182	17.7	+266	+314	35 8	+235	+347	53.8	+206	+392	71.8	+218	+367
188	18.2	+303	+365	36.2	+281	+395	54.3	+260	+434	72.3	+273	+413
194	18.7	+225	+273	36.7	+220	+310	54.8	+216	+353	72.8	+237	+346
200	19.2	+182	+225	37 2	+184	+255	55.2	+183	+290	73.3	+206	+285
206	19.7	+149	+184	37.7	+163	210	55.7	+178	+240	73.7	+205	+240
212		+ 92	+123		+102	+137		+114	+156		+129	+154
223		— 12	+ 11		— 10	+ 3		— 3	+ 5		+ 10	— 4

TABLE VI (*Continued*)

t	Saros V Year	λ_s	λ'_s	Saros VI Year	λ	λ'_s	Saros VII Year	λ_s	λ'_s	Saros VIII Year	λ_s	λ'_s
0	1775.1	0	0	1793.1	0	0	1811.2	0	0	1829.2	0	0
6	75.6	−26	−59	93.6	−40	−70	11.7	−46	−75	29.7	−54	−91
12	76.1	−62	−113	94.1	−84	−142	12.2	−91	−150	30.2	−104	−179
18	76.6	−160	255	94.6	−139	−303	12.6	−216	−325	30.7	−241	−372
24	77.1	−140	−256	95.1	−123	−300	13.1	−203	−327	31.2	−232	−383
30	77.6	−194	−302	95.6	−184	−343	13.6	−278	−379	31.6	−315	−446
41		−271	−368		−248	−382		−351	−419		−376	−494
47	1778.9	−313	−404	1797.0	−283	−403	1815.0	−391	−441	1833.0	−409	−520
53	79.4	−340	−430	97.4	−301	−412	15.5	−412	−450	33.5	−422	−532
59	79.9	−476	−576	97.9	427	−527	16.0	−534	−543	34.0	−524	−591
65	80.4	−437	−502	98.4	−377	−427	16.4	−476	−416	34.5	−443	−426
71	80.9	−527	−524	98.9	−472	−459	16.9	−577	−458	35.0	−532	−457
77		−540	−500		−488	−445		−594	−453	35.4	−539	−442
83		−553	−477		−504	−431		−611	−448		−551	−431
88	1782.2	−564	−459	1800.3	−517	−419	1818.3	−625	−444	1836.3	−561	−422
94	82.7	−532	−409	00.8	−494	−380	18.8	−613	−416	36.8	−550	−392
100	83.2	−528	−384	01.2	−494	−371	19.3	−616	−401	37.3	−551	−372
106	83.7	−333	−119	01.7	−302	−109	19.8	−427	−147	37.8	−365	−124
112	84.2	−307	−65	02.2	−272	−48	20.2	−394	−78	38.3	−330	−56
118	84.7	−251	+14	02.7	−209	+39	20.7	−319	+19	38.8	−246	+42
129		−189	+117		−136	+177		−216	+179		−121	+201
135	1786.0	−155	+173	1804.1	−96	+252	1822.1	−160	+266	1840.1	−53	+288
141	86.5	−163	+194	04.6	−96	+293	22.6	−143	+319	40.6	−21	+344
147	87.0	−34	+334	05.0	+20	+407	23.1	−33	+423	41.1	+80	+441
153	87.5	−44	+301	05.5	+4	+355	23.6	−49	+369	41.6	+62	+389
159	88.0	+8	+331	06.0	+46	+369	24.0	−15	+375	42.1	+84	+388
165		+66	+364		+98	+388	24.5	+35	+390	42.6	+127	+397
171		+124	+397		+151	+407		+76	+397		+151	+390
176	1789.4	+172	+425	1807.4	+195	+423	1825.4	+110	+403		+169	+384
182	89.8	+195	+437	07.9	+233	+430	25.9	+149	+408	1843.9	+193	+377
188	90.3	+253	+470	08.4	+292	+455	26.4	+206	+428	44.4	+232	+383
194	90.8	+231	+406	08.8	+282	+398	26.9	+203	+377	44.9	+227	+341
200	91.3	+204	+336	09.3	+257	+323	27.4	+176	+298	45.4	+189	+261
206	91.8	+215	+286	09.8	+234	+276	27.8	+209	+266	45.9	+226	+252
212		+138	+189		+157	+176		+133	+172		+144	+161
223		−3	+11		+16	−7		+3	0		−6	−6

TABLE VI (*Concluded*).

t	Saros IX			Saros X			Saros XI			Saros XII		
	Year	λ_s	λ'_s	Year	λ_s	λ'_s	Year	λ_s	λ'_s	Year	λ_s	λ'_s
0	1847.2	0	0	1865.3	0	0	1883.3	0	0		0	0
6	47.7	− 66	− 83	65.8	− 78	− 78	83 8	− 81	− 65	1901 8	− 88	− 71
12	48.2	−127	−162	66.2	−151	−151	84.3	−157	−125	02 3	−170	−137
18	48.7	−280	−361	66 7	−324	−343	84 8	−337	−295	02 8	−358	−319
24	49 2	−280	−369	67.2	−345	−354	85 2	−360	−287	03 3	−383	−306
30	49.7	−384	−433	67.7	−476	−422	85.7	−509	−359	03.8	−544	−401
41		−442	470		−551	−455		−592	−392		−632	−456
47	1851.0	−474	−490	1869 1	−592	−473	1887.1	−637	−410	1905.1	−680	−486
53	51.5	−486	−495	69.6	−610	−474	87.6	−661	−410	05.6	−707	−498
59	52.0	−576	−542	70.0	−684	−511	88.1	720	−440	06.1	−759	−531
65	52.5	−480	−362	70.5	570	−319	88.6	−589	−238	06.6	−620	−331
71	53.0	−555	−386	71.0	−629	−337	89 0	−631	−252	07.1	−650	−342
77	53.5	−550	−365	71.5	−608	−313	89.5	−596	−224	07.6	−606	−313
83		−555	−352		−600	−298		−579	−209		−586	−298
88	1854.4	−559	−341	1872 4	−593	−286	1890.4	−565	−197		−569	−286
94	54.8	−546	−313	72.9	−575	−263	90.9	−547	−181		−549	−271
100	55.3	−540	−291	73 4	−561	−243	91.4	−530	−166	1909.4	−529	−256
106	55.8	−352	− 53	73.8	−371	− 20	91.9	−348	+ 29	09.9	−359	− 93
112	56.3	−312	+ 5	74.3	−321	+ 42	92.4	−301	+ 69	10.4	−316	− 73
118	56.8	−214	+ 99	74.8	−210	+135	92 8	−189	+157	10.9	−206	+ 11
129		− 53	+257		− 16	+298		+ 20	+322		+ 10	+180
135	1858.2	+ 35	+343	1876 2	+ 90	+387	1894.2	+134	+412	1912.3	+128	+272
141	58.6	+ 88	+398	76.7	+165	+449	94.7	+222	+480	12,7	+227	+347
147	59 1	+186	+487	77.2	+268	+535	95 2	+330	+565	13.2	+336	+431
153	59.6	+174	+443	77.6	+269	+496	95.7	+344	+535	13.7	+360	+414
159	60.1	+194	+438	78.1	+291	+483	96.2	+368	+517	14.2	+385	+397
165	60.6	+239	+446	78 6	+344	+486	96.6	+429	+520	14.7	+454	+411
176		+261	+415		+338	+431		+398	+449		+412	+347
182	1862.0	+273	+398	1880.0	+335	+401	1898.0	+381	+410	1916 1	+388	+312
188	62.4	+298	+393	80.5	+343	+379	98.5	+374	+379	16.5	+372	+283
194	62.9	+290	+352	81.0	+323	+333	99.0	+350	+337	17.0	+348	+250
200	63.4	+238	+264	81 4	+255	+233	99.5	+270	+231	17.5	+259	+145
206	63.9	+270	+262	81.9	+286	+244	1900.0	+301	+258	18.0	+291	+197
212		+177	+167		+185	+150	00.5	+193	+170	18.5	+182	+122
218		+ 84	+ 72		+ 84	+ 56		+ 77	+ 83		+ 85	+ 60
223		+ 6	− 7		0	− 22		− 11	+ 11		+ 7	+ 4

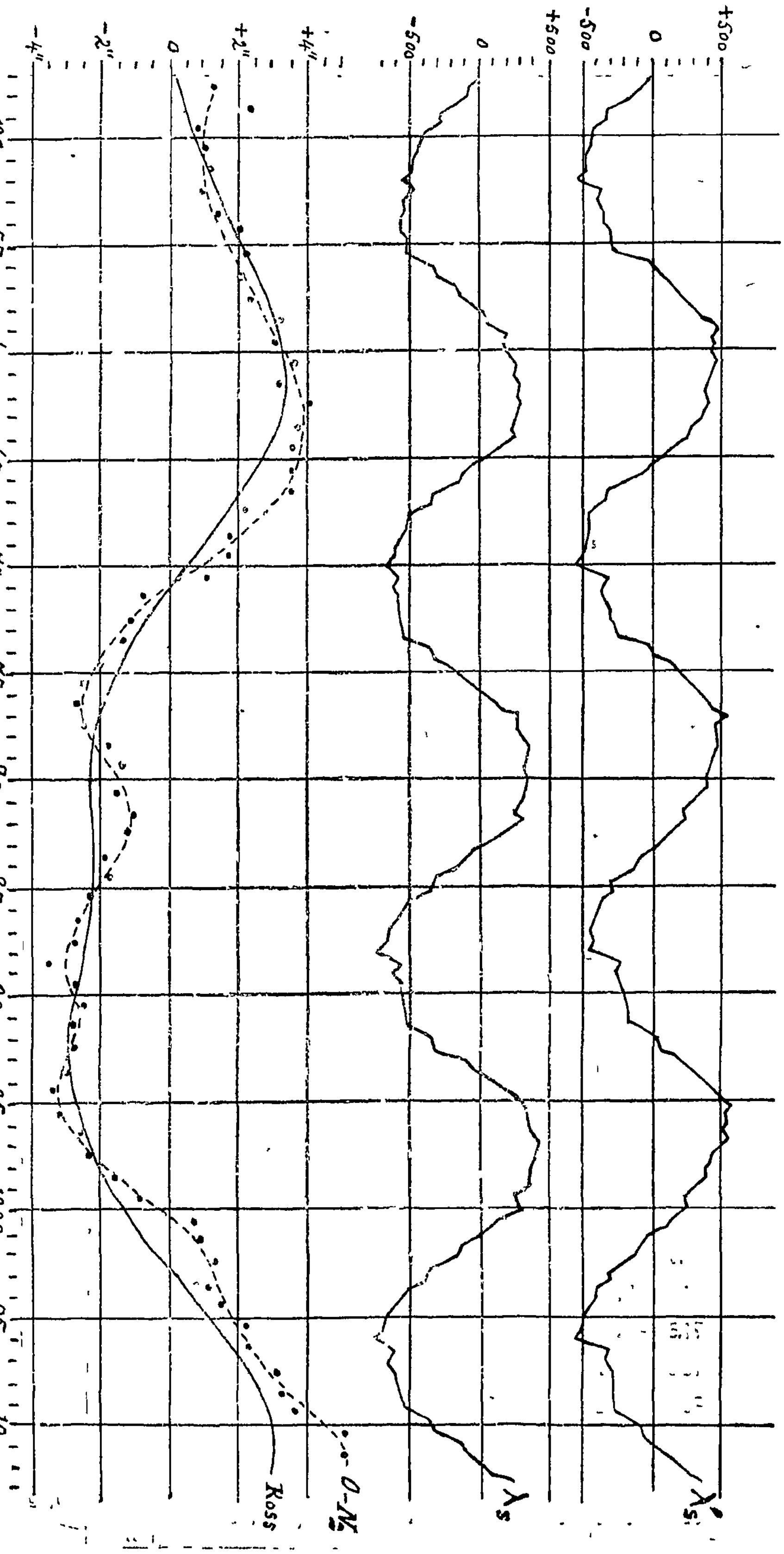
Finally we give in Table VII the new reduction of the meridian observations by Prof. BAKHUYZEN, which was referred to above. The column $M-N_2$ contains the excess of the observed correction to the tabular longitude of the moon over NEWCOMB's "great fluctuation". The systematic corrections mentioned in Part I have already been applied. For the years 1905 to 1912 two results are given: the upper one is derived from the observations of the limb, the lower from the crater Mosting A. The third column contains the means of the numbers of the second column and the results from the occultations, i. e. NEWCOMB's minor fluctuations. The latter were however corrected by $+0''.18$ for reasons stated in Prof. BAKHUYZEN's paper (these Proceedings, Jan. 1912). For the years 1905.5 to 1908.5 the mean given depends on the observations of the limb and the crater alone. From these means I have subtracted the sum of the corrections for the difference between the theories of HANSEN and BROWN, which were given in Part I of this paper. This sum was computed by a graphical process, of which I estimate the maximum error at about $\pm 0''.05$. The thus corrected mean is given in the fourth column. The second decimal, which has no real value, has been dropped. The last column gives the residuals remaining after subtracting Ross's empirical formula, without its constant term $-0''.18$, viz.:

$$+2''.9 \sin 6^\circ.316\,(t-1844.5) + 0''.8 \sin 15^\circ.65\,(t-1880)$$

It will be seen that these residuals, although small, are as a rule somewhat larger than those found previously by Ross himself and by BAKHUYZEN. The explanation of this is as follows. The residuals Δ-Ross given by BAKHUYZEN in 1911 (these Proceedings Jan. 1912, p. 691) showed a marked period of nine years, which entirely disappears by the application of the perturbational corrections (14) and (22). The term (43) is nearly identical to the term which was already applied by Ross, and consequently does not affect the residuals to any appreciable extent. The terms (20), (15), and (21) however, especially (21), produce a considerable increase of the residuals. No doubt it would be possible by a small adjustment of Ross's formula considerably to improve the representation, but it is evident that a perfect agreement with the observations can never be reached by a formula containing only two terms. If a new empirical formula were to be derived it would, of course, be necessary first to correct the term of long period, and to apply the corresponding corrections to the theory. It seems opportune to defer such an investigation until the moon's longitude for the next few years will be

TABLE VII.

	M—N₃	Mean Obs—N₃	Corr^d mean	Δ Ross.		M—N₃	Mean Obs—N₃	Corr^d mean	Δ Ross.
1847.5	+0″08	+0″89	+1″3	+0″8	1883.5	- 2″41	—2″20	—1″9	+0″1
48.5	+1 .22	+1 .66	+2 .3	+1 6	84.5	- 2 .30	—2 .10	- 1 .7	+0 .2
49.5	+0 .26	+0 .28	+0 .8	0 .0	85 5	- 2 .46	—2 .38	—2 .2	—0 .2
50.5	+0 .31	+0 .76	+1 .0	0 .0	86.5	—2 .60	—2 .60	—2 .6	—0 .4
51.5	+1 .37	+1 .18	+1 .1	- 0 .1	87.5	—3 .11	—2 .76	- 2 .8	—0 .6
52.5	+1 .20	+1 .15	+1 .0	—0 5	88.5	—3 .64	—3 .47	—3 .4	—1 .2
53.5	+1 .95	+1 .42	+1 .4	—0 .4	89.5	—2 .50	- 2 .90	—2 .6	- 0 .3
54.5	+2 .29	+1 .94	+2 .0	—0 .1	90.5	—2 .70	—2 .95	—2 .5	0 .0
55.5	+1 .57	+1 .94	+2 .2	—0 .2	91.5	—3 .65	—3 .28	—2 .8	—0 .2
56.5	+1 40	+1 .75	+2 0	—0 .7	92 5	—3 .78	—3 .09	—2 8	0 .2
57.5	+2 .48	+2 .39	+2 .4	—0 .6	93.5	- 3 .02	—2 .76	2 .9	—0 .3
58.5	+3 .71	+3 .70	+3 .2	0 .0	94.5	—2 .32	—2 .56	3 .3	—0 .7
59.5	+3 .83	+3 .96	+3 .1	—0 .4	95.5	—1 .95	—1 .98	—3 .1	—0 .6
60.5	+5 .17	+4 .64	+3 .6	+0 .1	96.5	—1 .55	—1 .28	—2 .5	0 .2
61.5	+4 .78	+4 .14	+3 .2	—0 .3	97.5	—0 .89	—1 .34	- 2 3	—0 3
62 5	+5 .11	+4 .60	+4 .0	+0 .5	98.5	—0 .84	—1 .07	- 1 .5	+0 .2
63.5	+4 .21	+3 .70	+3 .7	+0 .4	99.5	—0 .39	—0 .80	—0 .7	+0 .6
64.5	+2 .83	+2 .96	+3 .6	+0 .5	1900 5	—0 .12	+0 .04	+0 .7	+1 .5
65.5	+2 .04	+2 .42	+3 .6	+0 .8	01.5	—0 .26	—0 .08	+0 .9	+1 .1
66.5	+1 .52	+2 .26	+3 .6	+1 .3	02.5	+0 .33	+0 .42	+1 .4	+1 .1
67.5	+0 .56	+0 .93	+2 .2	+0 .3	03.5	—0 .17	+0 .32	+1 .2	+0 4
68.5	+0 .30	+0 .75	+1 .8	+0 .4	04.5	+0 .59	+0 .94	+1 .6	+0 .3
69.5	+0 .39	+1 .10	+1 .8	+0 9	05.5	+1 .97	+1 .73	+2 .3	+0 .6
70.5	+0 .39	+0 .64	+1 .1	+0 .7		+1 .53			
71.5	—1 .26	—1 .18	—0 .7	—0 .6	06.5	+2 .42	+1 78	+2 .4	+0 .2
72.5	—1 .21	—1 .40	- 1 .0	—0 .4		+1 .43			
73.5	—1 .70	—1 .65	—1 .3	—0 .4	07.5	+2 .39	+2 .42	+3 .1	+0 .5
74.5	—2 .27	—2 14	—2 .0	—0 .7		+2 .63			
75.5	—2 40	—2 .25	—2 .5	—1 .0	08.5	+2 .64	+2 .65	+3 .3	+0 .6
76.5	—1 .89	—1 .90	—2 .7	—1 .0		+3 .01			
77.5	—0 .87	—1 .28	—2 .4	—0 .6	09.5	+3 .21	+3 .16	+3 .8	+0 .9
78.5	+0 .32	—0 .44	—1 .7	+0 .2		+3 .12			
79.5	—0 .23	—0 .26	—1 .4	+0 .6	10.5	+5 .32	+4 .84	+5 .1	+2 .0
80.5	—0 .33	—0 .76	—1 .5	+0 .5		+4 .36			
81.5	—0 .16	—0 .78	—1 .1	+0 .9	11.5	+5 .57	+5 .30	+5 .1	+1 .9
82.5	—1 .39	—1 .30	—1 .2	+0 .8		+5 .04			


-4"
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1900
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10
Ross
O-N
λs
λs'

known, or at least until we know how long the increase, which began a few years ago, will last.

The accompanying diagram shows for the years 1847 to 1912 the excess of the observed longitude of the moon over NEWCOMB's great fluctuation, i. e. the number contained in the fourth column of Table VII. ROSS's curve is also given, (including the constant term — 0".18). The broken line is the smooth curve mentioned in Part I from which the values given in Table III were read off. The diagram also contains the purely periodic part λ_s and λ'_s of the perturbation in longitude produced by the absorption of gravitation on the two hypotheses regarding the distribution of density within the earth.

Chemistry. — *"The equilibrium Tetragonal Tin ⇆ Rhombic Tin."* By Prof. ERNST COHEN. (Communicated by Prof. VAN ROMBURGH).

(Communicated in the meeting of November 30, 1912).

It has struck me, and from several quarters my attention has been called to it, that in a communication from Mess^rs SMITS and DE LEEUW [1]) "On the system Tin" there occur a number of mistakes which require rectification.

1. The relation between the existence of a transitionpoint tetragonal tin ⇆ rhombic tin at 200° and the method of preparation of the so-called *corn-tin* or *grain-tin* has been first pointed out in the paper which I have published in 1904 with Dr. E. GOLDSCHMIDT [2]). From the communication of Mess^rs SMITS and DE LEEUW the reader might conclude that they (or SCHAUM) have first noticed this connection.

2. In the paper which I published in 1904 with Dr. E. GOLDSCHMIDT, a conclusion was drawn, from the experiments of WERIGIN, LEWKOJEFF, and TAMMANN [3]) as to the situation of the said transition point, which proved to be erroneous. Dr. DEGENS has pointed this out [4]) and as in my opinion he was quite right. I have hastened to rectify my error in the section of ABEGG's Handbuch der anorganischen Chemie [Vol. **3**, (2) 532 (1909), special p. 552] edited by myself. Evidently, the recent literature on this subject has not been known to Mess^rs SMITS and DE LEEUW, for they still base their communication on my paper that appeared five years previously.

[1]) These Proc. XV, p. 676.

[2]) Chem. Weekblad **1**, 437 (1904), special p. 446. Zeitschr. f. physikal. Chem. **50**, 225 (1904), special p. 234.

[3]) Drud. Ann. **10**, 647 (1903).

[4]) Dissertation, Delft 1908, p. 33.

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