leaves, but without flowers. I consider it a large leaved shoot (for instance, from a latent bud of the trunk) of *Quercus spicata* Sm. var. *gracilipes* King.

On the authentic label is written: "*Quercus sphaerelata* Bl., Pasang, Java, in montanis Moeriah, Herb. Waitz."

5. *Quercus nitida* Bl. l.c. 294.

The view, already expressed in Koord. and Valeton l.c. 65, that this species, which so far has only been recorded with certainty from Sumatra, does not yet belong to the flora of Java, is confirmed in my opinion, by the material in 's Rijks Herbarium at Leiden.

Leiden, March 1908. (*To be continued*).

Geophysics. — "*The Starting Impulse of Magnetic Disturbances.*" By Dr. W. van Bemmelen.

(Communicated in the Meeting of March 28, 1908).

Last year [1]) I communicated the compilation of a statistical list of the magnetic disturbances which the magnetograph at Batavia has recorded during the period 1880—1899. I drew the attention to the phenomenon of the starting impulse i. e the suddenly appearing change of the magnetic elements, which very often accompanies the beginning of a magnetic storm.

This phenomenon appearing in like manner at Batavia and at other places, I ventured a supposition on the manner in which we can represent to ourselves the appearance of magnetic disturbances. To obtain a closer knowledge of this in my opinion very instructive phenomenon, I requested at the end of 1906 all Magnetic Observatories to give me their data for a number of cases selected by myself.

With great readiness those data were forwarded to me from several observatories and it is an agreeable duty for me to express at this place my thanks for it.

Besides this material received from many sides I have worked out all cases registered at Batavia and at Buitenzorg and have also been able to watch the nature of the electric earth-current during the phenomenon. I wish to communicate here of the results of this material what is most important, commencing with Batavia.

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[1]) Proceedings 29 September 1906.

Also: Observations made at the R. Magn. and Met. Observatory of Batavia, Vol. XXVIII, App. III.

BATAVIA

Out of the diagrams obtained in the period 1882—1899, I measured for 131 cases the amount and the duration of the initial movements of the three components (Horizontal Intensity $= H$, Declination $= D$, Vertical Intensity $= Z$.

Direction of the initial movement.

ΔH was without exception positive.

ΔD was with a few exceptions West; but 12 % of the number of cases was introduced by a slight Easterly movement.

ΔZ was negative; but in 6% of the number the movement was introduced by a slight positive movement.

Duration.

Here I have *not* taken into consideration the duration of the slight introductory movement.

124 cases furnished:

$\Delta H = 4.5$ min. $\Delta D = 3.2$ min. $\Delta Z = 12.0$ min.

The duration of the Z movement is in general difficult to determine, as the decrease of the vertical force keeps on mostly much longer.

It is important to notice that the initial movement of D stops or is inverted, whilst of H the increasing movement keeps on.

Amount.

The average amplitude of the movement, arranged according to the different parts of the day in which it took place, expressed in 0.00001 C. G. S. ($= \gamma$):

h	ΔH	ΔD	ΔZ
0—6 a.m.	+ 45	7 W	— 11
6—12 „	+ 41	10 „	— 16
0—6 p.m.	+ 52	7 „	— 16
6—12 „	+ 40	8 „	— 11

Of a characteristic inequality of the vector during the day little is noticeable. The amount ΔH arranged according to the duration of the movement is:

Duration	ΔH	Number of cases
0— 2 min.	53 γ	15
2— 4 „	43	45
4— 6 „	42	35
6— 8 „	33	20
8- 15 „	46	6

So the amount of the movement is fairly well independent of the duration, from which results inversely that *the shorter the increase of H is, the quicker it is.*

Let us finally observe that the appearing of the slight easterly movement did not show any preference for certain times of day or year.

BUITENZORG.

Since May 1906 a TÖPFER-SCHULZE magnetograph has registered at Buitenzorg, which gives the curves of the three elements on the same registering-strip; this circumstance besides that of giving finer lines, greater sensibility and wider measure of time, is very suitable for the study of the initial-movement.

For the period May 1906 — Nov. 1907 I measured 29 cases and from that material it was clearly evident that in most cases the movements of the elements display a certain independence of each other and *do not always begin at the same moment.*

I calculated the azimuth of the horizontal component of the vector for the first part of the movement, so *before* the movement of D is inverted, and I found in 20 cases directions between the extremes N and N 58° W, an average of

$$N\ 21°\ W.$$

Vertical Intensity.

The results for ΔZ were surprising; for the vertical component showed, different from that of Batavia, an introductory positive movement followed by the slow negative movement known of Batavia.

Here no instrumental cause had anything to do with the matter: both magnetographs (of ADIE and SCHULZE) registered this premovement at one time at Batavia very rarely, but at Buitenzorg regularly. Luckily registrations have been made for more than a year at Batavia and at Buitenzorg at the same time and from those registrations it was evident that the introductory movement at Buitenzorg precedes that of Batavia. The introductory movement at Buitenzorg commences (according to the average of 29 cases) 0.3 minute after the H-movement begins and lasts about 1 to 3 minutes, after which the Z-lines of both places show simultaneously a decrease.

ANSWERS TO THE QUESTIONS.

The data on the initial movement were asked for in my letter

for a number of cases, in which that movement had made its appearance under different circumstances at Batavia. The answers were of a very different nature and therefore I made of each case a summary diagram in which in an equal manner under each other was noted down the registration image of H, D and Z for each station. In many respects it would be useful to reproduce these diagrams, but the difficulties connected with it and the numerous imperfections of the material have made me set it aside.

These imperfections are chiefly caused by the measure of time of the diagrams of the various observatories not being taken ample enough to be able to fix the simultaneity of the different movements, which take place within a few minutes.

From the notation of the TOPFER-SCHULZE magnetograph at Buitenzorg where the circumstances were pretty favourable I could deduce with certainty that the commencement of the movement of the three components is often not simultaneous. Accuracy down to parts of minutes cannot be demanded of most magnetic diagrams, where 1 hour takes up 10, 15 or 20 mm. It was therefore impossible to draw trustworthy maps, on which the vector of disturbance during the initial movement was represented in its varying magnitude and direction, so I must restrict myself to the following.

In the following table the direction of the movement has been given for all the cases.

In the case of an introductory movement of slight amplitude this is indicated for H by $+/-$ or $-/+$, for D by w/E or e/W.

In some cases the introductory movement was of the same order of amplitude with the following movement and this is accordingly indicated by $+/-$ or $-/+$ and W/E or E/W.

We see in this table the movements of *one* or more elements for different constant direction. Further information is furnished by the annotation of the Rev. P. DE MOIDREY in the "Bulletin des Observations de l' Observatoire de Zie-Ka-Wei, T. XXXI" and the copies of disturbances for Greenwich, Parc st. Maur and Samoa. The former states for Zi-Ka-Wei the frequency of the positive H and Z movement at 95 pCt. and of the E movement of D at 90 pCt.; whilst out of the Samoa curves the H and Z movement proves to be $+$ in 9 cases.

Hence the following movements appear pretty constant:

Station	H	D	Z	Geogr. Latitude
Batavia	+	W	—	—6°
Buitenzorg	+	W	+/—	—7°
Manila	+		+	15°
Zi-Ka-Wei	+	E	—	31°
Samoa	+		+	—13°
Honolulu	+		no reg.	20°
San Antonio			+	29°
Coimbra	+		no reg.	40°
Greenwich			+	51
St. Maur			—	49
Perpignan	+			43°
Bombay	+	no reg.	no reg.	19°
Mauritius	+		+	—20°
Melbourne			—	—38°

So it seems that the constancy in the appearance of a definite sense of movement decreases with the geographical latitude and that it is furthermore for H the greatest and for D the smallest, moreover for H always with a *positive* sense of movement.

EXTENSION OF THE MOVEMENT ABOUT THE EARTH.

The nature of the initial movements, which took place simultaneously on different points of the surface of the earth could be studied by means of the above mentioned summary diagrams.

It was quite evident that for H and D but not for Z places lying close to each other show about the same image, but that for places in other parts of the world this is often quite different.

The small number of stations only allowed a closer investigation of that difference for North-America and Europe. I therefore give below a survey of the movement for H and D in Europe and North-America, where however the latter for the years 1892—94 is represented only by two stations (Toronto in Canada and San Antonio in Texas).

Date		Europe		N.-America	
		ΔH	ΔD	ΔH	ΔD
May 18th	1892	+/−	w/E	−/+	e/W
July 16th	,,	−	E and W	are missing	
Aug. 12th	,,	−	E and W	+	E and W
,, 18th	1893	+	e/W	are missing	
Sept. 25th	,,	+	W	,, ,,	
Jan. 2nd	1894	+	w/E	−/+	E/W (only San Antonio)
Febr. 20th	,,	−/+	w/E	−/+	w/E
July 20th	,,	+	e/W	+	e/W
Aug. 20th	,,	+	e/W	+	w/E
Nov. 13th	,,	−/+	e/W	+/−	w/E
Aug. 16th	1902	+	e/W	+	w/E
April 5th	1903	+	e/W	−/+	w/E
Febr. 3rd	1905	+	e/W	+	w/E

We see here repeatedly that the European group and the American one are the reverse of each other, and in Europe we find mostly a $N.W.$ vector, in America a $N.E.$ one, which points to a centre of disturbance near Greenland, thus situated near the magnetic pole and that of the Aurora-Borealis or pole of disturbance.

For some cases I have tried to obtain a survey by means of a map with the simultaneous vectors of disturbance, but here the almost insurmountable difficulty presents itself, that one cannot make up simultaneous values of ΔH and ΔD, which are really trustworthy. Above I pointed to the fact with reference to the measurements on the Buitenzorg magnetograms, that this requires an ample and trustworthy time-measurement. Though it was impossible for me to calculate exact values for the azimuth of those vectors, yet I could about fairly well find the direction.

For the initial movement of the disturbance on Febr. 3d, 1905 the vectors of the introductory movement pointed to a centre at the West coast of North America and that of the main movement to a centre near Greenland. For the disturbances on Aug. 16th, 1902 and April 5th, 1903 I found about the same [1]).

VERTICAL FORCE.

It is a striking fact, that places lying at a slight distance from each other show an opposite change in the vertical component. Above

[1]) Writing this I see from a paper by Dr. BRÜCKMANN (Meteor. Zeitschrift, 1907, No. 12) on the same subject, that he also arrives at a centre of disturbance appearing in the vicinity of the magnetic pole.

I already mentioned that Batavia and Buitenzorg are different in this respect and now I discovered that Greenwich and Paris (Parc St. Maur) show regularly an opposite movement. Out of the reproductions of diagrams of disturbances published for several years I made the following list.

St. Maur and Greenwich.

	St. Maur				Greenwich		
Date	Hour	ΔH	ΔD	ΔZ	ΔH	ΔD	ΔZ
1891 March 2	2	+	e/W	−	+	e/W	+
June 14	9	+	E	−	+/−	e/W	+/−
1892 January 4	19	+	E	−	+	w/E	-
February 13	5	+	E W	−	−/+	E/W	+
„ 20	19	+	E/W	−	+	W	+
March 11	23	+	E/W	−	+	W	+
May 16	22	+	E	−	+	E	+
„ 18	8	+	w/E	−	+/−	w/E	+/−
June 27	5	+	E	−	+	W	+
July 12	18	+	W	−	+	W	+
July 16	13	+	e W	+/−	+	E/W	−/+
Aug. 3	14	+	W	−	+	W	+
Sept. 5	23	−/+	E/W	−	−/+	E/W	+
1893 March 25	4	+	E	−	+	E	+
April 26	16	−/+	W	−	−/+	e/W	−/+
June 9	13	+	W	−	−/+	e/W	−/+
August 6	4	+	e/W	−	+	e/W	+
September 8	1	+	W	−	−/+	w/E	+
1894 January 11	20	+	W	−	+	W	+/−
February 20	20	+	E	−	−/+	W/E	+
„ 22	22	+	W	+/−	+	W	+
„ 28	15	+	W	−	/+	e/W	−/+
July 20	6	+	E	−	+	E	+
1895 May 29	15	−/+	e/W	−	−/+	e/W	−/+
1896 July 23	18	−/+	W	−	−/+	e/W	+
Aug. 29	17	−/+	W	−	−/+	e/W	−/+
1898 March 15	1	+	W	−	+	W	+
„ „	13	+	W	−	/+	W	+
September 9	14	+	W	−	+	W	+ [1]
1899 January 28	19	+	W	−	+	W	+
June 28	22	+	W	−	+	W	+ [1]

[1] During a disturbance.

It is seen that ΔH and ΔD generally correspond; only for H the introductory movement is more frequent at Greenwich; ΔZ is regularly opposite, for Greenwich positive and for Paris negative.

It is remarkable to notice out of the reproduced registering lines how the oscillations following upon the initial movement correspond again for the two places; a single striking quick movement amid the disturbance, as it were a new starting impulse, is then again opposite. This repetition seems to be a real phenomenon. Thus the initial shock on Oct. 30th, 1903 was a clear initial movement amid a disturbance going on already for hours. At places with higher latitude it lost itself in the oscillations of that older disturbance. The phenomenal violence of the second part of the disturbance is perhaps owing to two disturbances being placed one above the other. At the violent disturbances of Febr. 13th, March 6th and June 27, 1892, as well as of Aug. 6th, 1893 two initial impulses appeared.

THE CAUSES OF THE INITIAL MOVEMENT.

The remarkable inequality of the movement in the vertical force, so constant for places situated close to each other, offers us perhaps a means to clear up what is puzzling in this phenomenon.

If we attribute the appearance of those vectors of disturbance to that of electric currents, as is more than probable, then it is impossible to assume that the movement of electricity which generates these vectors would have in the free atmosphere such a distribution limited to the place. The cause of this must be in the appearance of the electric earth-current. We must assume that, when suddenly a disturbance arises, the earth-current then generated selects fixed paths through the earth-crust.

That the earth-current for different places of the earth situated close to each other may be different, is highly probable; at least for the surface-current I have found it lately [1]) for North- and South-Java. The inequality was, that as the corresponding magnetic variations became shorter the earth-current variations increased more in amplitude for the volcanic southern part than for the alluvial and diluvial northern part.

This great difference in earth-current must become much less for the deeper strata; proof of this is found in the equality of the magnetic variations at Batavia situated on the Northcoast of Java and at Buitenzorg on the edge of the volcanic part.

But the possibility for a difference when a current is suddenly

[1]) See the following paper: Earth-current registration at Batavia, 2nd communication.

SUMMARY TABLE OF THE DIRECTION OF THE INITIAL MOVEMENT.

		Batavia			Manila			Zi-Ka-Wei			Tokio			Samoa			Honolulu		
		H	D	Z	H	D	Z	H	D	Z	H	D	Z	H	D	Z	H	D	Z
25 IV	1892	+	0	−	+	0	+	+	W										
18 V	"	+	e/W	+/−	+	0	+	+	W										
12 VII	"	+	W	−				+	0	−									
16 "	"	+	W	−				+	E	−									
12 VIII	"	+	W	−				+	E	−									
18 "	1893	+	W	−	0	0	+	+	E	−									
25 IX	"	+	W	−	+	0	0	+	0	0									
2 I	1894	+	E	−	+	W	+	+	E	−									
20 II	"	+	W	−	+	W	+	+	E/W	−									
20 VII	"	+	W	−	+	0	+	+	E	−									
20 VIII	"	+	W	−				+	E	−									
13 XI	"	+	W	−	+	0	+	+	E	−									
		Buitenzorg																	
16 VIII	1902	+	W	−				+	E		+	E	+				+	W	
26 I	1903	+	0	+/−				+	E		+	E	+				+		
5 IV	"	+	e/W	+							+	E	0				+	E	
3 II	1905	+	e/W	+				+	E	−	+	E	+	+	E	+	+	E	+
2 III	"	+	W	+				+	E	−	+	E	+	+	W	+	+	W	+

		Sitka			Baldwin			Toronto			Cheltenham			Vieques			San Antonio		
		H	D	Z	H	D	Z	H	D	Z	H	D	Z	H	D	Z	H	D	Z
25 IV	1892																		
18 V	"							−/+	E/W								+	W	+
12 VII	"																	w/E	
16 "	"																		
12 VIII	"							+/−	e/W								+	e/W	
18 "	1893																		
25 IX	"																		
2 I	1894																−/+	E	−/+
20 II	"							−/+	w/E								+	E	+
20 VII	"							−/+	e/W								+	W	+
20 VIII	"							+	w/E								+	w/E	+
13 XI	"							+/−	W								+/−	w/E	+
16 VIII	1902	−/+	e/W		+	e/W		+	e/W		+	e/W							
26 I	1903							−/+	0		+	W	0						
5 IV	"	−/+	E/W		−/+	W/E		−/+	w/E		−/+	w/E	+	+	W/E				
3 II	1905	−/+	e/W	−/+	−/+	w/E	−/+	+	W/E		+	W/E	+	+	w/E				
2 III	"				+	e/W	+/−	−	W		−	e/W	+/−	−	E				

		Coimbra			Ebro			Stoneyhurst			Kew			Perpignan			St. Maur		
		H	D	Z	H	D	Z	H	D	Z	H	D	Z	H	D	Z	H	D	Z
25 IV	1892	+	E					−/+	E					+	E	−			
18 V	"	+	e/W								+/−	w/E	+/−	+	E	−	+/−	w/E	−/+
12 VII	"	+	E/W					+	W		−/+	e/W	+	+	E	+	+	E	−
16 "	"										+	E/W	−/+	+		−/+	−/+	W/E	+/−
12 VIII	"							−/+	E/W		−/+	W/E	−/+	+	W/E	+/−	−/+	e/W	+/−
18 "	1893	+	W								+	e/W	+	+	W	+	+	e/W	−
25 IX	"	+	W					+	E/W		+	W	+	+	E	+	+	W	−
2 I	1894	+	w/E					+	E		+	w/E	+	+	E	+	+	w/E	−
20 II	"		e/W					+	E		+	w/E	+	+	E	+	+	E	−
20 VII	"	+	e/W					+/−	e/W		+/−	e/W	+/−	+/−	e/W	−/+	+/−	e/W	−/+
20 VIII	"	+	e/W					+	W		+	e/W	+	+	W	+	+	e/W	−
13 XI	"	+	e/W					+	W		−/+	e/W	−/+	+	W	+	+	e/W	−
16 VIII	1902	+	E								+	w/E		+			+	w/E	
26 I	1903	+	0																
5 IV	"	+	E/W					+	e/W		+	e/W	−/+				+	e/W	−
3 II	1905	+	e/W		+	e/W		+	e/W		+	e/W	+				+	e/W	+
2 III	"	−/+	e/W		−/+	e/W	+/−	−/+	W/E		−/+	w/E	+/−				−/+	E/W	+/−

		Uccle			Utrecht de Bilt			Copenhagen			Potsdam			Munich			Pola		
		H	D	Z	H	D	Z	H	D	Z	H	D	Z	H	D	Z	H	D	Z
25 IV	1892							−/+	e/W	−									
18 V	"	+/−	w/E	+/−	+			+/−	w/E	+/−									
12 VII	"	+		+	+	W	+	+	E	+									
16 "	"	−/+		−/+				−/+	E/W	−/+									
12 VIII	"	−/+	w/E	−/+				−/+	e/W	−/+									
18 "	1893	+	e/W		−/+	e/W													
25 IX	"	+	W		+	W	+	+	W	+									
2 I	1894	+	w/E		+	W/E		+	E	+									
20 II	"	+	w/E		−/+	W/E	−/+	−/+	w/E	−/+									
20 VII	"	+/−	e/W	+	+	e/W	+/−	+/−	e/W	+/−									
20 VIII	"	+	W	+	+	e/W	−/+	+/−	e/W	+/−									
13 XI	"	−/+	e/W		−/+	e/W	−/+												
16 VIII	1902	+		0	−/+	w/E	−/+							+	E		−/+	E	+
26 I	1903	−	W	+	−	W								+	0				
5 IV	"	+	W	+	−/+	e/W	+							+	e/W		+	e/W	+/−
3 II	1905	+	e/W	+	−/+	e/W					+	e/W	−	+	e/W		+	e/W	−
2 III	"	−/+		−/+	−/+	e/W					−/+	W	−	−/+	E/W		−/+	W	−

		Bochum			Jekaterinburg			Bombay			Dehra Dun			Barrackpore			Mauritius		
		H	D	Z	H	D	Z	H	D	Z	H	D	Z	H	D	Z	H	D	Z
25 IV	1892							+											
18 V	"							+									+	W	+
12 VII	"							+									+	W	+
16 "	"							+									+	W	+
12 VIII	"							+									+	W	+
18 "	1893							+											
25 IX	"							+									+		
2 I	1894							+									+	W	+
20 II	"							+									+		+
20 VII	"							+									+	e/W	−
20 VIII	"							+									+	E	+
13 XI	"							+									+		+
16 VIII	1902		E					+				W					+	W	+
26 I	1903		0					+			+								
5 IV	"		e/W					+			+	W					+	w/E	+
3 II	1905		e/W		+	W	0	+			+	W		+	W		+	0	+
2 III	"		W		+	E	+	+			+	E		+	E				

		Melbourne			Victorialand		
		H	D	Z	H	D	Z
25 IV	1892						
18 V	"	−/+	E/W	+/−			
12 VII	"	+	E	−			
16 "	"	+	w/E	−			
12 VIII	"	−/+	W/E	+/−			
18 "	1893	+/−	e/W	−			
25 IX	"	+	E	−			
2 I	1894						
20 II	"	+	w/E	−			
20 VII	"	+	e/W	−			
20 VIII	"	−/+	E/W	+			
13 XI	"	+	W	−			
16 VIII	1902	+/−	E	−	+	w/E	
26 I	1903						
5 IV	"	+/−	E	−	−/+	e/W	
3 II	1905	−/+	E/W	−			
2 III	"	+	e/W	−			

generated is made possible by these results for deeper strata too. On the diagrams obtained at Batavia when the earth-current is registered, there are a few cases of an initial impulse and as the time unit was very ample (1 millim. = 1 min.) and moreover as the magnetic component too was registered with great sensitiveness, these cases are very instructive.

Date and Hour.			Initial movement of the E-W earth-current commences before that of the magn. North-component.		
14 May	1906,	4^h *a.m.* Bat. T	0.0 min.	Commenc.	gradual
30 July	,,	3 ,, ,,	0.6 ,,	,,	,,
3 September	,,	7 *p.m.* ,,	0.0 ,,	,,	pretty sudden
22 ,,	,,	8 ,, ,,	0.0 ,,	,,	sudden
10 November	,,	12 ,, ,,	0.0 ,,	,,	pretty sudden
26 ,,	,,	1 *am* ,,	0.0 ,,	,,	sudden
26 December	,,	11 *p.m.* ,,	0.0 ,,	,,	,,
8 January	1907	12 ,, ,,	0.0 ,,	,,	,,
15 ,,	,,	3 *am.* ,,	0.0 ,,	,,	pretty sudden
14 February	,,	3 ,, ,,	0.0 ,,	,,	sudden
27 January	1908	9 *p.m.* ,,	0.0 ,,	,,	,,

With the exception of *one* case, where indeed the determination of the time was less accurate on account of the gradual commencement of the initial movement, we thus find simultaneousness for the initial movement for earth-current and magnetic vector.

As has often happened, we must change a hypothesis of explanation formed on first getting acquainted with the facts, when later on we have arrived at a more extensive knowledge of the facts by extension of the material.

This is the case here too.

Though I at first thought to find the seat of the current of electricity which is supposed to generate the initial impulse in the highest layers of the atmosphere, the nature now revealed of the vertical component induces me to look for the seat rather in the earth itself.

At the outset the current must be in general an East-West current of positive or West-East of negative electricity, because everywhere the horizontal magnetic component increases The situation and form of that current seems to be variable and to undergo a great influence

of a proper magnetism of the earth; it also seems to change during the increase in intensity and situation. For the magnetic disturbance itself following immediately upon the initial impulse we must assume that especially extra terrestrial currents are the cause; at least for the magnetic after-disturbance as well as for the part that shows a regular daily variation I have made this probable [1]). Moreover the Aurora Borealis points to this. The magnetic vector of after-disturbance is the mean vector of disturbance deprived of its greater and smaller oscillations during the disturbance. It increases rapidly after the initial impulse and then slowly decreases.

As here the horizontal intensity just decreases we must conclude to a likewise W-E. current of negative electricity in these higher atmospheric layers. It remains an open question why the intra-terrestrial current at the outset and the extra-terrestrial current during the further course of the disturbance have both a constant East-West direction.

Geophysics. — *"Registration of the earth current at Batavia."* 2nd part. By Dr. W. v. BEMMELEN.

In my first paper on the registration of electric earth-currents at Batavia, to investigate the connection between the oscillations in earth-current and magnetic force, I had to point to several unanswered questions.

First of all the fact that the earth-current between Anjer and Batavia is four times greater than the one between Batavia and Cheribon. I hope soon to be able to measure the current between Batavia and a place E. and S. of Anjer to try to shed light on this abnormality.

Further more it remained a mystery why that connection with the magnetic force showed such a characteristic difference for the current between Semarang and Batavia with that for the current between Batavia and places closer by. That difference consisted chiefly in the fact, that when the duration of a magnetic oscillation becomes shorter, the amplitude of the earth-current increased much more for the long line than for the short one.

I pointed out, that perhaps an influence of the distance might

[1]) Met. Zeitschrift 1895. p. 321. T. M. VIII p. 153.