

# British Association for the Advancement of Science.

*The Register from Shide, Isle of Wight, England.*  
Observer, JOHN MILNE; Assistant, SHINOBU HIROTA.

*Circular No. 1, issued by the Seismological Committee, Professor J. W. JUDD, F.R.S. (Chairman), Mr. JOHN MILNE, F.R.S., Shide, Isle of Wight (Secretary).*

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### *Registers from similar Horizontal Pendulums (Milne type) 1899-1900.*

These registers are for the most part continuous with those published by the Seismological Investigation Committee in the Reports of the British Association, 1896 to 1899.

The time employed is Greenwich mean civil time, expressed in hours, minutes, and decimals of minutes.

*D. first P.T.'s.*—This should refer to the duration of the first preliminary tremors or the first uniform thickening of the trace.

*Amplitude* indicates half the complete range of the maximum motion.

Where this exceeds one millimeter it is expressed in millimeters and in seconds of arc. Values less than one millimeter refer to a thickening of the line, and indicate half its width.

These registers refer to Shide, Kew, San Fernando (Spain), Cape of Good Hope, Mauritius, Cairo, Calcutta, Madras, Bombay, Tokio, and Batavia.

To the Tokio register there is appended a list of local earthquakes, a few of which are common to the records of horizontal pendulums in distant countries.

It is hoped that corresponding registers will be received from Toronto, Victoria (B.C.), Arequipa, Swarthmore College (Philadelphia), Mexico, Cordova (Argentina), New Zealand, Beirut, Honolulu, Trinidad, and Paisley.

Shide No.	Date	Com- mence- ment	D. of first P.T.'s	Maxi- mum	Amplitude		Total duration	Remarks
					H. M.	MM. SEC.		
<b>1899.</b>								
273	April 4		H. M. M.	H. M.	MM. SEC.	H. M.		
			2 8.5	—	0.5	—	0 10	—
274	" 5		24 0.0	—	—	—	—	—
About								
275	" 6		8 34.3	—	0.75	—	0 5	—
276	" 7		17 40.5	—	0.5	—	0 13	—
277	" 12		16 35.6	—	—	—	—	—
278	" 12		18 8.7	9.3	18 25.2	2.0 0.94	2 40	Reinforcement at 20h. 28.4m.
279	" 13		4 28.5	—	{ 4 33.5 4 37.6 }	1.5 0.70	0 29	Tremors make commencement uncertain.
280	" 13		11 9.8	—	—	—	—	—
281	" 15		5 0.0	—	—	—	—	—
About								
282	" 16		14 2.7	15.5	{ 14 18.3 14 21.4 }	4.5 2.11	1 48	—
283	" 17		2 47.3	14.5	—	0.75	—	0 48
Tremors make commencement uncertain.								
284	" 28		20 46.9	—	—	0.75	—	0 12
285	May 2		15 32.1	—	—	0.5	—	0 10
286	" 8		4 39.1	—	—	0.5	—	1 0
A second max. at 5h. 10.6m.								
287	" 14		14 47.3	—	—	0.3	—	0 20
288	" 15		13 51.4	—	—	0.5	—	0 28
289	" 17		19 54.3	—	20 49.2	0.5	—	1 15
A second max. at 20h. 49.2m.								
290	June 4		19 36.5	—	—	0.25	—	0 5
291	" 5		4 46.9	6.2	—	2.25 1.05	2 46	—
292	" 5		15 17.7	—	15 39.5	1.25 0.58	0 50	—
293	" 9		12 8.8	—	—	0.25	—	0 50
294	" 14		11 21.1	8.0	11 55.2	5.5 2.58	3 0	—
295	" 17		1 22.5	—	—	0.25	—	1 0
296	" 19		9 10.8	—	—	0.25	—	0 45
297	" 19		12 56.3	—	—	0.25	—	0 15
298	" 24		17 56.2	—	—	0.5	—	0 25
299	" 29		23 14.3	—	23 59.3	0.5	—	1 5
300	July 2		12 59.0	—	—	0.5	—	0 5
301	" 2		20 14.5	—	—	0.25	—	0 4
302	" 3		16 37.2	—	—	0.25	—	0 4
303	" 7		9 25.6	—	—	0.25	—	0 6
304	" 8		14 2.4	—	—	0.25	—	0 5
305	" 9		19 27.5	—	20 3.7	0.75	—	1 10
306	" 10		22 57.5	—	—	0.25	—	0 25
307	" 11		7 39.8	15.0	7 54.8	1.0 0.41	1 20	—
308	" 12		1 42.9	—	2 1.9	1.25 0.51	1 20	—
309	" 14		13 36.6	15.6	14 3.6	3.0 1.23	3 0	—
310	" 17		11 17.7	—	—	0.5	—	1 5
311	" 17		17 16.7	—	—	0.5	—	0 2
312	" 19		12 48.8	—	—	0.25	—	—
313	" 20		10 18.8	—	—	0.5	—	0 45
314	" 21		11 54.7	—	—	0.25	—	0 3
315	" 26		12 52.3	—	—	0.25	—	0 3
316	" 26		15 10.2	—	—	0.25	—	0 3
Time uncertain.								

## The Register from Shide, Isle of Wight, England—continued.

Shide No.	Date	Com-mence-ment		D. of first P.T.'s	Maxi-mum		Amplitude		Total duration	Remarks
		H.	M.		H.	M.	MM.	SEC.		
317	July 27	21	14.8	—	—	0.25	—	0 30	—	—
318	" 28	10	9.2	—	—	0.3	—	0 40	—	—
319	" 29	20	54.0	—	—	0.5	—	0 45	—	—
320	" 31	6	5.3	—	—	0.5	—	0 35	—	—
321	Aug. 2	15	50.2	7.2	15 57.4	1.0	0.54	0 26	—	Commencement possibly 2 or 3 mins. earlier.
322	" 2	18	17.2	—	18 42.9	2.5	1.35	1 0	—	—
323	" 3	22	49.1	—	—	0.25	—	0 5	—	—
324	" 4	5	4.6	11.0	5 50.2	2.0	1.08	2 20	—	—
325	" 7	16	9.8	—	16 36.3	0.75	—	0 30	—	—
326										
327		These were recorded, but the film was accidentally destroyed.								
328										
329										
330	Aug. 23	19	43.6	—	—	0.25	—	0 3	—	—
331	" 23	12	21.5	—	—	0.5	—	0 5	—	—
332	" 24	15	33.0	18.0	16 41.3	3.5	1.89	2 20	—	—
					16 47.6					
					16 50.7					
					16 53.8					
333	Sept 3, 4	23	49.1 or 35.0	53.8	1 1.5	15.0	—	—	—	At the max. the boom was caught by eclipse plate of the watch.
333	" 4	0	34.9	—	—	—	—	—	—	N.S. Record on smoked paper.
333	" 4	0	43.0	—	1 1.7	—	—	—	—	E.W. "
334	" —	—	—	—	—	—	—	—	—	Doubtful. (See San Fernando register.)
335	" 6	0	40.8	—	—	0.25	—	0 8	—	—
336	" 6	17	1.0	—	—	—	—	—	—	Doubtful.
337	" 10	—	—	—	17 48.0	—	—	—	—	N.S. Record on smoked paper.
338	" 10	21	23.0	—	22 23.5	—	—	—	—	E.W. "
339	" 10	21	23.07	—	22 23.5	—	—	—	—	" "
339	" 14	8	2.9	—	—	0.25	—	0 12	—	—
340	" 14	10	20.3	—	—	0.25	—	0 12	—	—
341	" 16	5	45.9	—	5 55.9	0.75	—	0 50	—	—
342	" 17	13	19.9	—	13 31.1	2.5	1.57	1 20	—	—
343	" 20	2	16.4	—	2 25.7	8.0	5.04	2 0	—	—
					2 30.8					
344	" 23	11	23.3	—	11 40.8	4.5	2.43	1 50	—	—
					11 41.9					
					11 43.9					
345	" 23	13	47.9	—	14 20.7	4.5	2.43	1 50	—	—
					14 21.8					
					14 23.8					
346	" 27	8	33.9	—	—	1.0	0.63	0 45	—	Doubtful character.
347	" 29	17	22.2	5.0	18 21.6	2.5	1.57	2 40	—	—
348	Oct. 4	1	54.6	—	—	0.5	—	0 4	—	—
349	" 4	9	59.9	—	—	1.0	0.63	0 5	—	—
350	" 8	18	30.8	—	—	0.25	—	0 5	—	—

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## The Register from Shide, Isle of Wight, England—continued.

Shide No.	Date	Com-mence-ment		D. of first P.T.'s	Maxi-mum		Amplitude		Total duration	Remarks
		H.	M.		H.	M.	MM.	SEC.		
351	Oct. 13	16	8.2	—	16 20.0	—	—	—	—	—
352	" 13	18	21.5	—	—	—	—	—	—	—
353	" 18	15	30.7	—	—	0.5	—	0 10	—	—
354	" 19	9	44.0	—	10 43.5	2.0	1.08	2 30	—	—
355	" 21	4	4.2	—	{ 4 57.5	1.0	0.47	2 25	—	{ A small max. at 6h. 6.5m.
					{ 5 3.6					
356	" 29	14	6.9	—	—	0.5	—	0 5	—	—
357	Nov. 10	18	27.1	—	—	0.5	—	0 12	—	—
358	" 12	0	36.3	—	1 28.1	1.0	0.41	1 50	—	—
359	" 14	23	14.7	—	—	1.0	0.41	0 4	—	—
360	" 18	8	6.4	—	—	0.5	—	0 5	—	—
361	" 18	15	24.0	—	15 48.8	1.0	—	0 50	—	—
362	" 20	13	43.3	—	—	1.0	—	0 35	—	—
363	" 21	10	7.4	—	—	8.0	—	0 12	—	Doubtful.
364	" 23	11	30.0	—	—	—	—	2 0	—	Commencement lost.
365	" 24	10	22.8	—	11 5.9	4.5	1.84	1 15	—	—
366	" 24	18	53.6	—	19 39.7	9.0	3.68	2 45	—	—
					19 51.0					
367	" 28	5	7.1	—	—	0.25	—	0 5	—	—
368	Dec. 4	1	27.5	—	—	0.25	—	0 3	—	—
369	" 13	10	45.0	—	—	0.25	—	0 3	—	Time approximate.
370	" 17	8	55.0	—	—	0.25	—	0 3	—	" "
371	" 25	—	—	—	13 11.5	0.75	—	0 30	—	" "
372	" 26	0	43.5	—	—	1 9.0	0.75	0 57	—	" "
373	" 31	11	7.3	3.0	11 17.6	1.75	0.71	0 45	—	" "
374	" 31	22	15.0	—	—	0.25	—	0 35	—	" "

Register from the Kew Observatory, Richmond, Surrey, England.  
Superintendent, Dr. CHARLES CHREE, F.R.S. Assistant, E. G. CONSTABLE.

The following register is compiled from the photographic records of a Milne horizontal pendulum No. 9, at Kew Observatory, and refers to E.-W. displacements. The time is Greenwich mean civil time, and midnight=24 or 0 hours.

P.T.'s=preliminary tremors, given in columns 3 and 4, the time in 3 being that of the first perceptible motion, and that in 4 being the duration from the time in No. 3, until the commencement of the large motions.

The time of the apparent 'repetition' of the maximum phase is noted in column 6, and the small numerals in brackets in column 7 show if the maximum amplitude occurred with the first phase or its 'repetition.'

The maximum amplitude is expressed in seconds of arc. The mean value for one millimetre = 0".65 from January to November, but the action of the pendulum during the latter month was doubtful, probably owing to friction of the pivot end of the boom. On November 28 and 29 endeavours were made to obtain satisfactory swings with the weight and tie fixed at distances similar to those employed at Shide, but without success, and so they were left as before, viz. at 2.5 to 3.5 inches respectively from the agate cup. The friction of the pivot on the jagged edge of the agate cup was got over by twisting the boom tube round through 45°. As the result of further experiments the weight and tie were altered on December 12

to 3.0 and 4.0 inches. These changes have naturally influenced the value of 1 mm. deflection of the boom, and the present value is 1 mm. = 0".85.

The action of the pendulum since the beginning of December has been satisfactory.

*Seismological Observations, Kew Observatory, 1899.*

Kew No.	Date	Commencement of P.T.'s	Duration (in minutes)	First maximum	Second maximum	Amplitude (in secs. of arc)	Total duration (in minutes)
78	April 1	H. M. 11 40.8	—	H. M. —	H. M. —	—	22.0
79	" 3	11 1.5	—	—	—	—	2.0
80	" 6	17 39.0	2.4	17 41.4	—	0.2	3.0
81	" 7	11 31.0	3.2	11 35.4	—	0.2	9.2
82	" 8	{ 5 58.8 8 42.2 8 56.6	—	—	—	—	1
83	" 8	13 59.2	—	—	—	—	4.3
84	" 9	10 52.5	—	—	—	—	17.5
85	" 9	13 51.4	—	—	—	—	4.0
86	" 10	9 43.8	—	? 10 13.8	—	—	38.9
87	" 10	20 30.2	—	—	—	—	14.8
88	" 11	21 57.2	—	—	—	—	3.0
89	" 12	17 47.2	29.6	18 35.1	—	0.46	104.6
90	" 13	4 0.0	32.1	4 43.0	4 48.5	0.25 (1)	74.8
91	" 17	8 22.2	—	—	—	—	3.0
92	" 20	9 30.0	—	—	—	—	7.5
93	" 22	7 20.2	—	—	—	—	7.5
94	" 30	21 3.3	1.6	21 4.9	—	0.24	5.5
95	May 3	{ 12 41.8 14 5.9 15 43.3	—	—	—	—	{ 2.0 7.0 2.0
96	" 4	{ 20 37.2 11 37.4 13 14.6	—	—	—	—	{ 2.0 2.0 3.5
97	" 5	{ 13 27.4 3 49.3	—	—	—	—	{ 4.0 38.3
98	" 8	3 49.3	—	3 49.8	—	0.2	38.3
99	" 12	23 12.2	1.6	22 13.8	—	0.2	4.3
100	" 13	{ 6 1.6 9 55.9 10 4.4	—	—	—	—	{ 2.4 — —
101	" 15	{ 9 12.8 9 21.6 7 51.7	—	—	—	—	{ 3.4 — —
102	" 17	{ 8 3.7 16 40.8 17 21.8	—	—	—	—	{ 3.0 — —
103	" 18	{ 17 41.0 13 25.2	—	—	—	—	{ 2.4 —
104	" 19	13 25.2	—	—	—	—	7.0
105	" 20	11 37.7	3.4	11 41.1	—	less than 0.2	5.0
106	" 20	22 6.3	—	—	—	—	5.0
107	" 26	{ 10 47.4 10 58.1 11 5.0	—	—	—	—	{ 2.4 — —
108	" 29	12 36.3	? 1.7	12 40.0	—	less than 0.2	14.7
109	" 29	16 44.3	1.0	16 45.3	—	0.37	4.2
110	June 2	10 27.8	—	—	—	—	5.6
111	" 5	4 48.5	3.5	4 53.3	4 58.5	0.32 (1)	52.3

*Seismological Observations, Kew Observatory—continued.*

Kew No.	Date	Commencement of P.T.'s	Duration (in minutes)	First Maximum	Second Maximum	Amplitude (in secs. of arc)	Total duration (in minutes)
112	June 5	H. M. 15 15.4	? 30.0	H. M. 15 46.2	H. M. 15 55.2	0.58 (2)	71.6
113	" 10	{ 11 11.2 11 55.7	—	—	—	—	2.4
114	" 14	11 28.6	22.5	11 52.0	11 59.1	1.90 (1)	129.4
115	" 18	15 27.0	—	—	—	—	3.0
116	" 20	17 42.6	? 2.0	17 44.8	—	0.20	11.5
117	" 29	14 27.5	—	—	—	—	4.0
118	July 2	{ 11 43.8 12 1.7 13 0.9	—	—	—	—	2.3
119	" 4	{ 7 44.7 8 18.3 8 25.9	—	—	—	—	2.3
120	" 6	12 43.2	3.3	12 48.0	—	0.20	11.0
121	" 9	14 46.3	—	—	—	—	7.0
122	" 9	19 25.4	37.9	20 7.1	—	0.25	47.0
123	" 11	7 57.4	—	—	—	less than 0.2	46.0
124	" 12	1 55.3	10.8	2 12.3	2 13.3	1.12 (1 & 2)	64.0
125	" 14	13 31.4	21.9	13 54.0	13 56.8	1.60 (1)	215.6
126	" 15	18 25.0	—	—	—	—	8.0
127	" 16	5 40.2	—	—	—	—	39.0
128	" 25	{ 8 18.8 9 28.7 10 0.3	—	—	—	—	3.0
129	" 28	? 10 16.5	—	—	—	—	39.7
130	Aug. 2	18 35.3	6.4	18 42.3	18 44.2	0.20 (2)	30.2
131	" 4	5 3.1	14.1	5 19.2	5 20.3	0.39 (2)	62.6
132	" 7	16 16.2	3.8	16 23.1	—	0.32	20.0
133	" 17	20 41.2	—	—	—	—	26.0
134	" 21	10 23.0	—	—	—	less than 0.20	85.6
135	" 22	8 29.7	5.8	8 36.6	—	0.22	9.1
136	" 23	{ 13 9.0 16 26.8	—	—	—	—	3.0
137	" 24	15 32.7	? 15.8	15 52.5	—	0.20	43.5
138	" 24	16 16.2	? 12.5	16 40.0	—	0.20	77.0
139	" 30	{ 8 17.8 8 23.6 8 27.8	—	—	—	—	3.0
140	Sept. 1	{ 20 40.6 21 22.9 22 8.8	—	—	—	—	3.0
141	" 2	9 39.7	—	—	—	—	3.0
142	" 4	0 33.6	8.3	1 3.0	1 7.3	7.49 (1)	163.2
143	" 6	11 44.6	—	—	—	—	3.0
144	" 10	17 15.3	7.3	17 50.1	17 53.5	2.18 (1)	99.0
145	" 10	21 1.6	58.9	22 20.21	22 25.6	10.8 (1)	180.0
146	" 14	{ 11 12.8 11 36.6 11 55.2	—	—	—	—	3.4
147	16	5 55.8	2.5	5 58.8	—	0.25	36.2
148	17	13 21.0	7.8	13 31.8	13 32.4	0.44 (1 & 2)	60.0
149	20	2 16.7	4.6	{ (1) 2 21.8 (2) 2 27.5 (3) 2 30.8	—	3.20 (3)	82.8



Analysis of Seismological Records at Kew Observatory during  
1899—continued.

Register No.	Description and Remarks
126, 128, 129	Same as No. 78.
127	A series of slight pulsations, all less than 0''·2.
130	A small movement only.
131	A long series of small swings. After 5h. 47m. the amplitude increased again, and the swing at 5h. 55·4m. was equal to the maximum recorded at 5h. 20·3m.
132	A small movement, with short P.T.'s.
133	There is some uncertainty about the values for this oscillation, owing to a photographic blemish, but the sheet indicates a series of very small swings.
134	A prolonged succession of slight pulsations.
135	A short and ill-defined movement.
136	Isolated broadenings of the normal line, about 3 minutes' duration each.
137 and 138	There is difficulty in defining the length of the P.T.'s in these two cases, owing to the very slight character of the swings.
139, 140, 141	Similar to No. 78.
142	This was the second largest disturbance recorded during the year. There was an interval of 17·4 minutes between the commencement of motion and the maximum phase, and 4·3 minutes between the maximum and its apparent repetition. The 'repeat' shocks are clearly visible till 2h. 3m.
143	There is evidence of several <i>very</i> slight isolated tremors till 12h. 44·7m.
144	A well-marked record, with an apparent interval of 27·5m. between the commencement of the larger motions and the maximum oscillation, with three distinct groups in the time. The 'repeat' phases are fairly traceable for 25m.
145	This was by far the largest disturbance yet recorded at Kew, and owing to the crossing of the photographic traces the magnitude of the maximum oscillation is a little uncertain, but it certainly exceeded 10''·8. The duration of the P.T.'s was abnormally long, followed by an interval of 20m before the maximum was reached, and the swings exceeded 5'' for over 2m. The 'repeat' shock starting at 22h. 25·6m. was also unusually prolonged, having a total duration of 5m. The large waves ended abruptly at 22h. 47m., and the subsequent swings were small.
146	Numerous slight tremors, lasting from 2m to 4m.; the times are given of the most pronounced, but there are faint markings much later.
147	Small, and not well marked.
148	Not of large extent. The 1st and 2nd maximum swings are equal, with a very short time interval. 'Repetitions' fairly well defined.
149	This was of an unusual character. The P.T. 'interval' was short, and the maximum began abruptly; this was repeated at 2h. 27·5m., and again more markedly at 2h. 30·8m., and the largest swing occurred with this latter movement. These phases of three groups can be detected up to 2h. 44m. with about 3m. to each, but the major motions ended at 2h. 57m.
150 and 151	There is a striking similarity in these two disturbances; the later one might easily be taken as an 'echo' of the first, both as regards character and time intervals throughout.
152	A long drawn out disturbance of no great amplitude. The motion to maximum interval was 7·0m. A marked 'repetition' at 18h. 12m. Total duration uncertain.
153 and 155	Similar to No. 78.
154	This must be taken as a doubtful movement.
156 and 157	Small swings, with feeble 'repetitions.'

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Analysis of Seismological Records at Kew Observatory during  
1899—continued.

Register No.	Description and Remarks
158	A large number of very slight movements, but lasting for 1h. 11m.
159, 161, 162	Similar to No. 78.
160 and 164	Of no great extent.
165	This has been tabulated, but is rather doubtful.
166	The maximum succeeds the P.T.'s suddenly, but the appearance of the trace suggests sluggishness of the boom.
167	Similar to No. 78.
168	Owing to failure of light the extent and duration of this disturbance is uncertain. The maximum phase was reached abruptly, the preceding tremors being small.
169	As in No. 166, the general look of this disturbance is indicative of a sluggish action of the boom. The motion to maximum interval was 16·8 minutes.
	No record for December 2-4, owing to paper jamming in rollers. On December 2 the weight and tie were shifted round the boom about 45° to alter position of agate cup on pivot. This corrected the sluggish working due to friction noted above.
170 and 172	Similar to No. 78.
171	A short disturbance of but slight amplitude.
173	Apparently a considerable number of slight tremors, with a maximum of 0''·25, but for want of corroboration at present this record must be accepted with caution.
174 and 175	Similar to No. 78.
176	Character slight. The maximum phase was apparently feebly 'repeated' four times.
177	Slight tremors, with a doubtful maximum at 0h. 49m.
178	Similar to No. 78.
179	A well marked movement, but not of long duration. The motion to maximum interval was 5·6 minutes. After the maximum oscillation the amplitude dropped rapidly; two 'repeats' can be traced, but after 1h. 28m., the swings are very small.
180	A small movement of an ordinary type, with the maximum amplitude at the second phase.

Seismological Register, Kew Observatory, 1899. Supplemental List of  
Small Disturbances.

K.O. No.	Date	Commence- ment of P.T.'s	Dura- tion of P.T.'s	1st Max.	Ampli- tude	Total Duration	Remarks
181	April 7	H. M. 17 41·0	M. —	H. M. —	secs. of arc. —	M. 3	Very slight, little more than a broadening of the normal line.
182	" 15	4 12·0	—	—	—	6	"
183	" 16	14 1·5	19·7	14 26·0	0·25	65·5	Very indefinite movement. Action of boom rather doubtful.
184	" 28	20 46·8	—	—	—	19	Similar to No. 181.
185	May 15	13 54·0	—	—	—	20	"

Seismological Register, Kew Observatory, 1899--continued.

K.O. No.	Date	Commencement of P.T.'s		Duration of P.T.'s		1st Max.	Amplitude	Total Duration	Remarks
		H. M.	M.	H. M.	M.				
186	May 17	7 19	27.6	---	---	---	---	81.6	Similar to No. 181. Some doubt as to time of commencement.
187	June 19	9 12.8	---	---	---	---	---	734	Similar to No. 181.
188	" 19	{ 12 41.2 13 1.0 13 9.6 }	---	---	---	---	---	2-3	"
189	July 3	16 37.3	---	---	---	---	---	3	"
190	" 7	9 15.8	---	---	---	---	---	4	"
191	" 17	11 24.0	Duration uncertain, light bad.			---	---	---	"
192	" 17	17 16.5	---	---	---	---	---	2	"
193	" 29	{ 20 53.8 21 30.0 }	---	---	---	---	---	4-5	"
194	August 2	15 41.2	16.4	15 58.3	0.25	---	---	40.4	Of small extent. Repetition of maximum at 16h. 18-7m.
195	Sept. 27	8 33.2	---	---	---	---	---	26.8	Similar to No. 181.
196	Oct. 4	9 55.0	---	---	---	---	---	19.3	"
197	" 24	4 20.2	---	---	---	---	---	51.3	Very small deflections. Action of boom doubtful.
198	Nov. 20	13 41.5	---	---	---	---	---	30.5	Similar to 181
199	Dec. 17	8 4.8	---	---	---	---	---	27.0	On November 24 the light failed from 10h. 3m. to 15h. 5m.

Register of Displacements recorded at the Alipore Observatory, Calcutta.  
G. W. KÜCHLER, Assistant Meteorological Reporter.

No.	Date	Time	Remarks	No.	Date	Time	Remarks
<b>1899.</b>							
11	Sept. 29	H. M. 17 11.4 17 29.6	Amp. 1.5mm.	13	Dec. 10	H. M. 12 35.4 13 39.6	Small and irregular.
12	Dec. 6	21 36.3 21 59.8	Slight oscillation and permanent displacement of the boom.	14	" "	16 43.3 17 4.9	" "

From October 5 to 21, the seismograph clock was under repair. From October 30 to November 7 there were large and continuous disturbances, probably caused by building operations in the vicinity. This work, which has been going on for nine months, seems to have altered the level of the column, and impaired the value of the records generally. It will not be completed until February 1, 1900, after which trustworthy records may be expected.

Register from the Observatory, Madras, March 17 to December 31, 1899.  
Director, C. MICHIE SMITH.

At the end of 1899 the instrument was taken to the Observatory at Kodaikanal, Palani Hills, where it was installed on a rock foundation.

No.	Date	Commencement G.M.T.	Duration First P.T.'s	Time of Maxima	Amplitude	Duration	Remarks	
<b>1899.</b>								
11	March 17	H. M. 6 9.0	M.	H. M.	SECS.	H. M.	Many small movements.	
12	April 3	8 48.6	---	---	---	5 0.0	Very slight.	
13	" 4	3 59.1	---	---	---	about 3.0	" "	
14	" 5	29.7	---	---	---	4.0	" "	
15	" 9	7 25.6	---	---	---	3.0	" "	
16	" 12	16 34.0	---	16 36.0	0.5	---	---	
16A	" 18	35.9	4	18 42.6	0.5	0 10.0	---	
17	" 13	4 50.2	3	4 56.0	0.5	0 20.4	---	
18	" 17	15 41.0	---	---	---	0 5.0	Very slight.	
19	" 18	6 28.0	---	---	0.2	0 5.0	Very slight.	
20	" 19	5 20.5	---	---	---	---	Very slight.	
21	" 21	20 31.0	---	---	---	4 53.0	Severe tremor storm.	
22	" 24	11 29.7	---	---	0.2	0 4.0	Very slight.	
23	" 25	9 29.8	---	---	---	0 5.0	Very slight.	
24	" 28	14 15.4	---	14 16.4	0.7	0 5.0	Very slight.	
25	" 28	14 26.1	---	14 26.1	4.2	0 8.0	Very doubtful.	
26	" 29	6 19.4	---	---	---	0 7.0	Very slight.	
27	May 15	14 3.2	---	14 3.2	0.5	0 7.0	Very slight.	
28	" 31	9 27.5	---	9 28.5	0.3	0 4.2	Very slight.	
29	June 19	2 42.1	---	2 42.1	0.4	0 7.4	Very slight.	
30	" 27	1 58.5	---	2 2.1	1.4	0 5.0	Peculiar form.	
31	" 29	2 42.0	---	2 44.1	2.6	0 7.0	Peculiar form.	
32	" 29	22 59.3	2	23 8.6	0.7	0 24.0	Peculiar form.	
33	July 9	19 12.8	1	19 17.0 19.0	1.2	0 26.0	Peculiar form.	
34	" 11	7 55.6	---	7 59.7	0.7	0 5.0	Peculiar form.	
35	" 12	2 29.3	1	2 36.4	0.2	0 16.0	Peculiar form.	
36	" 14	13 49.4	3	13 57.0 59.2	0.4	0 49.0	Maximum may have been lost. Sheet marked at 14h. 03m.	
36A	" 31	2h to 4h.	Many small	movements	5 41.1	0.7	0 16.0	Sheet marked at 14h. 03m.
27	August 4	4 53.4	2	5 4.1	0.7	0 16.0	Sheet marked at 14h. 03m.	
38	" 17	20 36.0	1	20 53.2	0.8	1 18.0	Sheet marked at 14h. 03m.	
39	Sept. 1	10 58.6	2	11 0.9	0.1	0 5.2	Sheet marked at 14h. 03m.	
40	" 6	17 11.6	---	17 13.1	0.1	0 4.0	Sheet marked at 14h. 03m.	
41	" 10	17 28.3	2	18 3.2	1.0	---	Sheet marked at 14h. 03m.	
42	" 15	7 40.0	---	12.5	0.7	---	Sheet marked at 14h. 03m.	
43	" 17	13 51.2	---	13 52.2	0.3	0 4.0	Sheet marked at 14h. 03m.	
44	Nov. 23	10 9.3	3.5	10 44.5 19 20.6	0.5 0.7	0 51.0	Sheet marked at 14h. 03m.	
45	" 24	18 51.8	5	25.8 29.4 32.0	0.5 0.4 0.4	1 12.0	Sheet marked at 14h. 03m.	

\* The entries in this register, when taken as a continuation of those published in the British Association Report, 1899, p. 175, would read 23, 24, &c., and not 11, 12, &c.

Register from Colaba, Bombay, Government Observatory, September 1898 to December 1899. Director, N. A. F. Moos.

The entries, Nos. 2 to 23, are corrections and additions to a list published, in the British Association Report 1899, p. 177.

B. A. Report No.	Observatory No.	Date	Time of Disturbance in G. M. T.				Amplitude in arc of Maximum Movement	Remarks
			Commencement of Preliminary Tremors	Beginning	Maximum	End		
<b>1898.</b>								
			H. M. S.	H. M. S.	H. M. S.	H. M. S.	"	
1	31	Sept. 22	12 32 3	12 40 45	12 45 59	12 54 24	0.22	
2	46	" 23	12 18 37	12 20 36	12 21 7	12 39 14	0.87	
3	52	" 26	4 45 44	4 56 15	5 0 11	5 8 44	0.40	
4	143	Oct. 11	17 2 36	17 25 42	17 36 42	17 48 57	0.78	
5	148	" 15	3 46 41	3 47 24	3 49 20	4 8 49	2.03	
6	556	Nov. 17	13 14 19	13 33 28	13 39 41	14 39 10	3.80	
7	644	Dec. 1	—	12 48 17	12 50 43	13 24 40	0.95	
<b>1899.</b>								
23	599	Mar. 7	—	1 32 15	—	1 45 14	—	
25	1501	June 29-30	—	22 57 56	23 12 10	0 7 44	0.57	
26	1679	July 9	—	19 15 31	19 23 23	19 46 4	1.56	
27	1611	" 12	—	2 26 44	2 38 31	2 54 36	0.71	
28	1687	" 14	13 45 38	13 56 14	13 56 20	14 39 50	1.42	
29	1655	" 15-16	—	23 59 51	—	0 29 58	0.50	
30	1656	" 16	—	0 30 46	—	1 11 40	0.50	
31	1657	" 16	—	1 12 5	—	2 54 55	0.35	
32	1744	Aug. 4	4 54 37	5 4 58	5 5 41	6 11 9	0.78	
33	1784	" 17	20 38 37	20 43 11	20 49 48	21 22 26	3.98	
34	1806	Sept. 4	—	0 45 25	1 18 34	3 9 51	4.66	
35	1811	" 10	—	—	17 58 47	—	0.78	
36	1812	" 10	—	—	22 38 9	—	1.78	
37	1801	" 17	—	13 44 44	13 51 29	14 12 6	0.53	
38	1933	" 20	2 23 50	2 33 59	2 39 54	3 49 3	2.58	
39	1943	" 23	11 28 32	11 57 37	12 5 41	12 31 36	0.53	
40	1945	" 23	—	14 42 6	14 43 22	15 17 13	0.45	
41	1968	" 23	17 13 34	17 21 40	17 23 41	18 9 46	0.68	
42	1972	Oct. 18	—	15 1 33	15 3 3	15 5 54	0.53	
43	1973	" 18	—	22 49 16	22 50 35	22 55 3	0.68	
44	1984	Nov. 23	10 0 57	10 20 46	10 30 56	11 51 47	5.93	
45	1986	" 24	—	10 12 27	—	10 41 4	—	
46	1987	" 24	19 0 11	19 13 30	19 19 48	19 48 5	0.99	
—	—	Dec. 31	20 27 43	—	20 33 49	20 49 39	1.06	

Register from San Fernando (Spain). Instituto y Observatorio de Marina. Director, Commadore J. VINIÈGRA.

No.	Date	Commencement G.M.T.	Dur. first P.T.'s	Maxima G.M.T.	Amplitude Secs. of Arc	Duration
<b>1899.</b>						
		H. M.	H. M.	H. M.		H. M.
<sup>1</sup> 30	July 17	5 17.0	0 32.2	5 56.5	0.27	1 11.3
<sup>2</sup> 31	" 19	13 27.9	—	—	—	0 3.10
32	Aug. 4	5 4.3	0 19.9	5 25.7	0.53	1 54.3
33	" 17	20 42.2	0 18.7	21 13.5	0.43	1 29.3
34	" 24	15 26.6	0 5.7	16 2.7 } 15 43.5 } 16 42.8 }	0.43	2 18.2
<sup>3</sup> 35	Sept. 4	0 33.6	—	1 7.1	8.17	3 19.9
36	" 4	5 9.9	0 27.3	5 40.3	0.43	1 17.8
37	" 10	17 9.9	0 14.7	17 47.1	2.58	2 12.2
<sup>4</sup> 37 bis	" 10	21 3.9	—	22 24.9	14.62	4 11.8
38	" 16	5 59.4	—	6 1.4	0.21	0 25.3
39	" 17	13 14.2	0 17.0	13 38.8	0.94	1 43.0
40	" 20	2 17.4	0 5.2	2 35.0	1.16	1 37.0
41	" 23	11 15.2	0 10.0	11 50.2	0.86	1 32.0
42	" 23	14 2.0	0 17.7	14 22.5	0.69	1 19.7
43	" 29	17 26.0	—	17 41.7	0.43	2 9.0
44	Oct. 19	9 43.4	—	—	—	2 32.2
<sup>5</sup> 45	" 24	4 19.0	—	—	—	1 55.7
46	Nov. 18	15 12.4	0 10.7	15 26.2	—	0 58.5
47	" 20	13 9.0	—	13 14.8	—	0 19.5
48	" 23	10 1.1	0 10.0	10 54.9	4.3	3 23.7
49	" 24	10 35.7	—	11 9.0	—	1 27.5
50	" 24	19 6.7	0 28.2	19 50.6	—	2 21.8
<sup>6</sup> 51	Dec. 14	5 14.5	—	—	—	4 32.0
52	" 25	13 4.2	0 2.5	13 25.3	0.21	0 34.8
53	" 26	0 40.5	—	0 44.2	0.17	1 23.3
54	" 31	11 7.8	0 8.0	11 18.4	0.43	0 54.0
55	" 31	20 50.1	0 13.7	21 6.1	0.26	1 0.2

<sup>1</sup> No. 33 in the Report for 1899 here reads No. 30, there being three entries in that register which do not refer to earthquakes.

<sup>2</sup> Very small.

<sup>3</sup> No preliminary tremors; the commencement was great motion.

<sup>4</sup> 37 and 37 bis, we think, is only one earthquake.

<sup>5</sup> In the list of September 18, this was entered wrongly.

<sup>6</sup> Very small motion.

Register from Abbassiah, Cairo, Egypt. Survey Department. Director, Captain J. H. LYONS, R.E. Superintendent, E. B. H. WADE.

No.	Date	Commencement	Duration of P.T.'s	Maximum	Amp. Secs. of Arc	Duration	Remarks
<b>1899.</b>							
1	Oct. 6	H. M. 10 46.8	M. None	H. M. 10 48.0	0.5	0 6	—
2	" 30	14 0.1	23	15 33.6	0.5	0 65	—
3	" 31	18 5	?	18 8.5	0.3?	0 25	—
4	Nov. 23	9 05.3	3 to 4	9 44.3	—	2 11	—
		—	—	0 47	—	—	—
		—	—	0 51.6	—	—	—
		—	—	0 56.8	1.66	—	—
		19 00.4	1 14	19 05	—	—	—
5	" 24	—	—	19 10.5	—	—	—
		—	—	19 25	—	—	—
		—	—	19 27	—	—	—
		—	—	19 29.3	—	—	—
		—	—	19 34.5	—	—	—
6	" 27	—	—	19 40.5	0.54	—	—
		—	—	19 43	—	—	—
		—	—	10 15	—	—	Doubtful.
7	Dec. 24	—	—	4 0	—	0 60	Slight isolated thickening.
	" 8	3 22	—	9 53.4	0.69	—	Trace tremulous throughout the day, so that it is difficult to interpret.
9	" 18	—	—	23 58.7	—	—	Slight isolated thickenings.
		—	—	1 6.0	—	—	" "
" 19	" 19	—	—	1 32.0	—	—	" "
		—	—	5 10.0	—	—	" "
		—	—	13 59.2	—	—	" "
10	" 21	—	—	15 24.9	—	—	" "

Register from the Royal Alfred Observatory, Mauritius, 1898-99.  
Director, T. F. CLAXTON, F.R.A.S.

The following table gives the commencement and duration of preliminary tremors (P.T.'s), time of maxima, and end of disturbance, with  $\frac{1}{2}$ -amplitude of greatest movements.

No. in Register	Date	Commencement of P.T.'s	Duration of P.T.'s	Time of Maxima	$\frac{1}{2}$ -Amplitude of Maxima	End of Disturbance	Remarks
<b>1898.</b>							
1	Sept. 19	H. M. ?	H. M. ?	H. M. 23 1.6	S.F.C.S. 2.4	H. M. ?	Commencement 1h. earlier?
2	" 22	?	?	13 50.4	0.45	?	—
3	Oct. 15	4 0.2?	?	4 10.0	0.15	?	—
4	Nov. 17	13 45.4	?	14 2.0	0.66	?	—
5	Dec. 1	?	?	12 58.7	—	—	Earthquake?
6	" 4	7 30.0	?	7 53.0	—	0.12	—
7	" 11	7 0.5	—	7 36.1	—	0.38	—
<b>1899.</b>							
8	Jan. 25	—	—	1 15.7	0.99	—	—
		—	—	1 19.0	—	—	—
9	"	—	—	—	—	—	From 6.30 to noon about twenty small disturbances, one about 9h., looks seismic.
		—	—	—	—	—	Slight thickenings of the trace.
10	March 6 to March 7	—	—	23 30.0	—	—	to
11	" 12	—	—	1 35.0	—	—	to
		—	—	8 20.0	—	—	to
12	" 23	10 46.3	0 39.7	10 50.0	—	—	to
		—	—	11 30.0	0.29	12 21.7	The principal movement which lasted 17.4m., contained four shocks, in addition to maxima:— (1) 11h. 33.6m.; (2) 11h. 37.3m.; (3) 11h. 39.2m.; (4) 11h. 43.2m.
13	April 16	?	?	15 19.6	0.23	?	Beginning and end masked by air tremors. Three maxima movements are given.
		—	—	13 20.7	0.22	—	Sheet changed during disturbance. Duration of P.T.'s uncertain. There were apparently four shocks, in addition to the two maxima given, i.e., (1) 6h. 52.3m.; (2) 6h. 2.4m.; (3) 6h. 5.6m.; (4) 6h. 7.8m.
		—	—	16 26.0	0.24	—	All movements except maxima masked by air tremors.
14	June 5	5 38.2	0 10.0	5 56.4	0.31	6 53.3	Small tremors lasted up to 12h. 0m.
		—	—	5 59.3	0.35	—	There were two principal movements in this disturbance: (1) 12h. 30m. to 12h. 40m. (containing the maxima), then small vibrations occurred till 12h. 45.9m., followed by the second large movement, lasting till 15h. 0.6m. with three maxima (amplitude of each = 0.20secs.) at (1) 12h. 47.4m.; (2) 12h. 50.2m.; (3) 12h. 57.7m. Movements masked by air tremors. Disturbance containing maximum lasted from 17h. 18.8m. to 26.0m.
15	" 5	?	?	6 21.0	0.31	?	—
16	" 9	11 46.6	0 9.0	12 8.0	0.46	2 41.4	—
17	" 14	11 30.0	1.0	12 12.8	0.36	—	—
		—	—	12 38.1	0.32	13 43.5	—
18	" 24	?	?	17 22.9	0.54	—	—





## Register from Batavia, Java.

No.	Date	Beginning	Maximum	Duration	Amp. in secs.
<b>1899.</b>					
		H. M.	H. M.	M.	"
42	Jan. 3	6 28.5	6 35.0	26	2.7
43	" 7	8 37.6	8 38.6	2	0.7
44	" 11	8 42.3	8 43.3	12	6.8
45	" 12	8 4.3	8 8.9	19	3.0
46	" 13	1 11.9	1 11.9	2	1.0
47	" 15	6 35.2	6 35.2	2	1.7
48	" 18	3 53.0	3 54.6	3	0.9
49	" 20	22 43.2	22 46.1	16	4.0
50	" 23	1 55.0	1 57.7	27	4.7
51	" 25	0 5.4	0 16.7	32	1.0
52	" 25	23 13.5	23 14.0	1	0.7
53	" 28	17 9.6	17 13.8	21	1.6
54	" 29	20 35.8	20 38.8	21	1.8
55	" 30	0 49.4	0 50.6	3	0.7
56	" 30	24 46.5	24 51.4	50	2.1
57	Feb. 4	18 17.7	18 17.8	5	2.6
58	" 10	19 53.7	19 57.7	40	6.0
59	" 12	9 5.0	9 7.6	6	1.3
60	" 17	22 1.7	22 1.8	4	0.6
61	" 23	21 46.7	21 50.3	15	1.5
62	" 27	0 3.2	0 5.4	4	1.1
63	" 28	2 48.8	2 53.9	37	1.9
64	Mar. 1	1 8.3	1 9.7	44	8.7
65	" 2	6 45.4	6 46.3	3	0.8
66	" 3	0 53.0	1 0.6	11	1.0
67	" 3	1 33.7	1 37.5	8	1.4
68	" 6	14 31.4	14 36.3	29	1.5
69	" 6	19 51.5	19 56.6	51	2.0
70	" 6	22 43.0	22 43.2	5	0.7
71	" 7	1 3.3	1 10.5	46	1.0
72	" 12	10 8.2	10 12.7	25	0.7
73	" 21	14 40.3	14 51.7	40	1.1
74	" 23	12 21.7	12 32.7	29	1.1
75	" 24	16 14.1	16 15.5	36	0.6
76	" 28	22 41.1	22 41.1	1	0.7
77	April 5	8 35.4	8 35.6	5	1.4
78	" 15	12 31.1	12 40.4	6	1.1
79	" 17	1 47.7	1 57.7	37	?
80	" 26	13 46.1	1 53.3	24	1.9
81	May 1	19 30.7	19 31.2	1	0.8
82	" 2	14 33.7	14 38.5	33	1.8
83	" 8	15 42.7	15 42.7	38	1.3
84	" 11	23 18.9	23 18.9	12	0.7
85	" 14	13 57.4	14 9.7	35	3.0
86	" 15	12 56.8	13 2.0	32	1.6
87	" 17	10 2.2	10 3.4	4	0.8
88	" 17	19 7.3	19 8.5	2	0.7
89	" 27	15 21.9	15 22.0	1	0.6
90	" 29	8 5.7	8 5.8	1	0.5
91	June 2	—	6 32.2	—	—
92	" 5	5 3.1	5 5.3	35	0.9
93	" 5	15 39.7	?	15	0.6
94	" 24	17 1.0	17 5.7	19	5.0
95	" 26	15 47.0	?	8	0.4
96	" 29	22 55.1	22 59.5	66	5.0
97	July 1	12 36.0	12 36.9	4	0.6
98	" 5	19 36.2	19 37.9	2	0.5

## Register from Batavia, Java—continued.

No.	Date	Beginning	Maximum	Duration	Amp. in secs.
		H. M.	H. M.	M.	"
99	July 7	9 34.3	9 35.7	5	0.6
100	" 11	7 46.2	7 55.3	57	1.5
101	" 12	9 11.4	9 11.9	10	0.4
102	" 13	15 11.5	15 11.5	14	1.8
103	" 13	21 1.6	21 6.6	14	1.2
104	" 17	13 45.2	14 0.3	88	3.4
105	" 17	5 41.6	5 54.6	20	0.7
106	" 17	10 42.5	11 2.7	54	1.5
107	" 17	13 25.5	13 27.7	12	3.0
108	" 17	17 12.3	17 16.1	4	0.8
109	" 20	9 12.6	9 50.1	44	0.6
110	" 29	20 23.0	20 24.4	2	0.6
111	Aug. 4	4 51.0	4 53.6	127	4.8
112	" 20	17 13.5	17 16.9	23	1.3
113	" 24	15 18.4	15 30.0	85	2.0
114	Sept. 10	17 30.2	18 8.2	76	2.0
115	" 10	22 0.0	22 56.3	131	9.3
115 bis	" 20	2 30.0?	—	99	—
116	" 24	12 14.8	12 15.0	1	0.6
117	" 24	23 6.4	23 7.1	7	1.3
118	" 26	20 33.2	20 47.8	27	1.0
119	" 29	4 30.0	4 33.3	7	1.0
120	" 29	17 7.3	17 11.6	101	24.0
121	Oct. 11	19 53.5	19 53.7	8	0.4
122	" 13	13 55.2	13 54.5	23	0.5
123	" 13	15 53.0	15 53.5	4	0.3
124	" 13	18 10.3	18 10.5	7	0.5
125	" 19	9 28.1	9 39.3	110	1.8
126	" 24	4 0.9	{ 4 6.5 } { 4 11.0 }	63	{ 4.0 } { 5.0 }
127	" 27	17 44.5	17 44.6	1	0.3
128	" 27	18 39.7	18 49.1	20	0.3
129	" 28	3 41.3	3 49.4	15	0.5
130	" 29	11 43.9	11 44.6	2	0.6
131	" 29	14 6.3	14 12.3 } 13.3 } 14.5 } 16.5 }	12	{ 0.5 } { 0.5 } { 0.5 } { 0.5 }
132	" 31	3 12.3	3 13.0	8	0.3
133	Nov. 3	4 32.5	4 35.8	7	0.7
134	" 7	23 53.7	24 4.4	16	0.3
135	" 10	20 28.0	20 28.9	8	1.1
136	" 11	22 52.7	22 54.1	5	0.5
137	" 12	0 16.7	0 17.2	1	0.3
138	" 16	14 59.0	15 0.7	4	0.5
139	" 23	10 0.5	10 21.0	95	0.9
140	" 24	10 0.7	10 6.3 } 10 7.6 }	78	{ 1.6 } { 2.4 }
141	" 24	18 50.7	18 57.6 } 18 58.7 }	52	{ 1.7 } { 1.7 }
142	" 30	17 58.4	17 59.4	2	0.3
143	Dec. 2	8 15.4	8 16.6	7	0.6
144	" 6	7 19.9	7 19.9 } 7 20.5 }	13	{ 0.8 } { 0.6 }
145	" 10	14 29.1	14 34.7	20	0.8
146	" 12	6 37.2	6 39.3	4	0.5

## Register from Batavia, Java—continued.

No.	Date	Beginning		Maximum		Duration	Amp. in secs.
		H.	M.	H.	M.		
147	Dec. 25	20	23	20	28	24	0.9
					7.5		2.3
					9.4		2.0
148	" 30	4	11.7	4	15.7	16	0.6
149	" 31	20	27.6	20	41.2	26	0.8
					42.2		0.8
					43.2		0.9
<b>1900.</b>							
150	Jan. 1	2	7.5	2	10.8	14	0.4
					11.7		0.4
151	" 3	22	11.0	22	21.6	12	0.6
					24.6		0.6
152	" 5	(2	6.2)			Clock stopped	—
153	" 6	9	33.7	9	34.9	3	0.6
					35.8		0.4
154	" 10	19	21.0	19	25.3	15	0.8
					26.3		0.9
155	" 11	9	17.9	9	21.2	90	1.2
					28.0		1.2
					29.7		1.6
					32.2		1.3
					39.0		1.2
156	" 13	10	22.5	10	22.7	31	0.6
					23.1		0.6
157	" 14	0	3.8		0.53	4	0.5
	" 14	16	13.7	16	13.9	31	27.25
	" 14	18	26.3	18	27.5	2	0.6
159	" 14	23	1.7	23	2.7		0.3
160	" 15	0	42.8	0	44.0	22	0.6
161	" 15	17	34.9	17	35.3	4	0.6
					36.1		1.2
162	" 15	20	36.2	20	46.0	24	0.3
163	" 18	5	3.9	5	8.3		1.0
					13.4	41	0.8
					13.9		0.7
					19.3		0.7
					19.9		0.8
					56.0		0.5
164	" 20	6	53.7	6	56.0	108	0.5
					7 3.7		0.5
					8 18.6		0.5
					8 18.9		0.4
165	" 21	1	36.5	1	39.7	13	0.6
166	" 21	22	49.0	22	52.9	8	0.3

152. Palembang earthquake registered by other seismographs and by the magnetographs. Ehlert's pendulum gave commencement at 2h. 6m. 11s. and no preliminary tremors.

157. At 16h. 13.7m. the Soekaboemi earthquake registered by all seismographs and magnetographs.

164. From 7h. 46m. to 8h. 14m. pulsations with amp. 0.05s. and oscillations of 30s.

## Register of Events recorded at the Royal Observatory, Cape of Good Hope, August 4 to December 31, 1899. Director, Dr. DAVID GILL, C.B., F.R.S.

No.	Date	Commencement	Dur. first P.T.'s	Maxima	Semi-Amplitude	Duration	Remarks
<b>1899.</b>							
7	Aug. 4	H. M.	40 mins.	H. M.	"	H. M.	
8	" 6	2 48.0	3 mins.	3 3.0	—	2 30	(?) Slight tremors follow for about 6h.
9	" 10	21 23.0	14 mins.	3 5.2	—	—	(?) Sudden displacement of boom.
10	" 11	3 30.8	—	—	—	—	Swing started, but immediately subsided.
11	" 14	9 58.0	—	—	—	0 10	(?) Minor disturbance of similar character at 15h. 30m. and 21h.
12	" 16	—	—	3 50	1.2	—	(?) Small tremors at 11h. 40m. (Aug. 15), and at intervals, culminating in a more violent disturbance at 3h. 50m. (Aug. 16). Slight tremors continue throughout the day.
13	" 17	20 56.5	18 mins.	21 17.5	1.1	1 30	
14	" 24	15 43.4	30 mins.	10 29.0	0.5	2 30	
15	Sept. 4	0 46.2	1 hour	1 51.5	—	—	Times recorded roughly on account of failure of occultation watch.
				2 0.9	—	3 0	
				2 12.9	—	—	
16	" 10	17 38.2	28 mins.	18 32.1	—	—	
				18 1.46	0.5	2 0	
17	" 10	22 1.4	24 mins.	23 0.4	—	—	Several slight thickenings of trace between Nos. 16 and 17.
				4.2	2.4	3 30	
				9.1	—	—	
				13.3	—	—	
				21.5	—	—	
18	" 12-13	—	—	—	—	—	Frequent thickenings of trace commencing about Sept. 12, 17h. 30m., and continuing about 24 hours, the amplitude never exceeding a fraction of a millimetre. Disturbances somewhat more sharply marked, but of small amplitude, between Sept. 12, 20h. 30m., and Sept. 13, 0h. 30m.
19	" 14-15	—	—	—	—	—	(?) Sept. 14, 11h. 30m.—Sept. 15. The trace is throughout tremulous. The disturbance is followed by others commencing at 11h. 17.9m., 11h. 38.6m., and 12h. 0.2m. A shock of earthquake lasting over about 10sec. was felt at 10h. 53.0m.
20	" 15	10 52.9	—	—	—	0 7	Thickening of trace.
21	" 16	—	—	6 44	—	0 6	
22	" 17	13 58.5	—	14 20.0	0.1	1 0	
				21.7	—	—	
				25.0	—	—	
				25.1	—	—	
				39.4	—	—	
23	" 20	2 34	16 mins.	2 41.0	0.1	—	Commencement not well marked.
				50.4	0.2	1 30	Slight tremors may subsequently be traced up till about 6h. 30m.
				54.3	1.1	—	
				8 0.2	0.8	—	Commencement not well defined.
				12 3.8	—	—	
24	" 23	11 48	30 mins.	6.5	—	1 30	
				27.7	0.2	—	
25	" 28	14 24.7	33 mins.	15 14.0	0.2	1 30	
26	" 27	8 21.3	5 mins.	8 41.5	0.3	1 0	
				45.0	0.3	—	

Register of Events recorded at the Royal Observatory, Cape of Good Hope—continued.

No.	Date	Commencement	Dur. first P.T.'s	Maxima	Semi Amp. (Half)	Duration	Remarks
27	Sept. 28	H. M. 7 14	—	H. M. —	0.1	H. M. 0 15	Minute tremors precede, but present no phase sufficiently well marked for measurement.
28	" 28	9 9.5	—	—	0.2	0 25	—
29	" 29	17 28.5	2 mins.	—	—	—	Minute tremors can be detected, afterwards followed by a decided thickening of the trace from 18h. 5m. to 18h. 11m.
30	Oct. 2-3	—	—	—	—	—	Records failed at 12h. 20m. Oct. 2. On re-starting at 7h. 40m. on Oct. 3, they present minute disturbances up till 9h. 30m. (suggesting that a more violent disturbance had preceded).
31	" 10	13 17.0 15 21.2 15 33.9	—	—	—	—	Small disturbances consisting of three abrupt jerks at the times quoted.
32	" 13	—	—	16 55 17 34	0.2	0 40	Trace thickens to about 0''8 of a millimetre.
33	" 13	—	—	19 13 21	0.3	0 25	—
34	" 19	9 44.2	32 mins.	10 24.9 28.5	0.7	2 0	Time of commencement possibly obscured by observer entering room.
35	" 24	4 13.3	—	4 52.1	0.2	2 30	Violent disturbance commenced suddenly at 19h. 50m., and continued until the instrument was opened for inspection at 7h. 40m. Nov. 2. On search being made it was found that spiders had found their way into the case, and the disturbance is attributed to their presence.
36	Nov. 1	19 5.0	—	—	—	—	—
37	" 6	—	—	21 17	—	0 3	Slight thickening of trace.
38	" 11	—	—	12 33	—	0 4	Slight thickening of trace.
39	" 12	—	—	1 8 11 13	—	0 15	Thickening of trace.
40	" 18	13 25.8	—	15 26.5 33.2 47 52	0.1	0 45	—
41	" 19	6 6	—	—	—	—	Slight tremors. (?) Air currents.
42	" 23	10 8.1	23 mins.	10 44.3	1.4	3 0	—
43	" 23	21 57	—	—	—	—	Small tremors, subsiding rapidly.
44	" 24	10 15	—	—	—	2 0	Several slight thickenings of trace, apparently of seismic character.
45	" 24	19 2.8	43 mins.	19 50 18 49.5	0.6	2 15	—
46	Dec. 25	—	—	—	—	0 10	Slight thickening of trace.
47	" 26	—	—	1 17.2	—	0 10	Slight thickening of trace.
48	" 31	—	—	11 33.9 38.5 42.0	—	0 25	—
49	" 31	—	—	21 21.7 28.8	0.1	0 30	Thickening of trace.

Register of Events Recorded at the Royal Observatory, Cape of Good Hope—continued.

No.	Date	Commencement	Dur. first P.T.'s	Maxima	Semi Amp. (Half)	Duration	Remarks
<b>1900.</b>							
50	Jan. 11	H. M. 9 30.5	45 mins.	H. M. 10 18.7 20 23.5	" 0.54 0.14	H. M. 2 20 0 40	—
51	" 15	20 22.9	—	58.8	—	—	—
52	" 16	8 34.1	—	—	—	—	Boom suddenly displaced from pivot.
53	" 20	7 3.2	—	—	—	2 15	Records interrupted between 7h. 35m. and 8h. 10m.
54	" 24	—	—	7 45.0 8 14.9	0.1	0 40	Two thickenings of the trace with very small tremors intervening.
55	" 29	—	—	23 11.5	0.06	0 15	Thickening of trace
56	" 31	—	—	13 40 45	—	—	Very slight thickenings of the trace.
57	" 31	—	—	20 21 30	—	—	" " "
58	Feb. 3	—	—	4 53.4 4 57.8	0.07	0 10	" " "
59	" 20	—	—	17.4	—	0 5	Very slight thickening of trace.
60	" 20	21 57.4	8 mins.	22 7.7	0.2	0 20	—
61	" 24	0 12.5	7 mins.	0 21.3	0.2	0 15	—

The disturbances marked (?) were originally registered as earthquakes, but are now believed to be due to instrumental defects.

Register from the Seismological Institute, Imperial University, Tokio, Japan.  
Director, Dr. F. ŌMORI.

'Normal line' means the full width of the line, as shown by Milne's Horizontal Pendulum.

Times in parenthesis are taken from the records of Professor Ōmori's Horizontal Pendulum.

1.0mm. of amp. (i.e. half range) = 0''6.

The period of the boom was always kept at 15 seconds.

No.	Date	Time of Commencement	Remarks
<b>1899.</b>			
1	July 24	H. M. S. 1 26 15 (1 23 21)	Probably a distant earthquake. Normal line = 0.4mm. P.T.'s = 1.0m. D = 1h. 29m. 1.7m. later a max. amp. = 1.25mm.
2	Aug. 26	5 1 18 (4 58 21)	Slight. Normal line = 0.35mm. P.T.'s = 0.2m. D = 10m. At the beginning a max. amp. = 0.55mm.
3	Sept. 4	0 30 55 (0 31 52)	Origin in Alaska. Normal line = 0.2mm. P.T.'s = 6m. 21s. D = 1h. 17m. 17m later a max. amp. = 1.35mm.

## The Tokio Register—continued.

No.	Date	Time of Commencement	Remarks
4	Sept. 9	H. M. S. 2 2 48 (2 0 25)	Moderate shock originated in North-Eastern Japan. Normal line = 32mm. P.T.'s = 1m. 4s. D = 49m. 1m later a max. amp. = 3.7mm.
5	" 11	a 11 37 7 11 42 43	Very slight.
6	" 13	14 8 4 (14 6 47)	Slight. Air tremor developed. No clear P.T.'s. D not clear. At the beginning a max. amp. = 0.75mm.
7	" 20	2 31 7 (or it may be 28 1)	Earthquake at Smyrna. Normal line = 0.3mm. Second tremor occurred at 2h. 48m. 25s., and the proper motion began at 2h. 55.9m. P.T.'s = 16m. D = 2h. 52m. 35m. later a max. amp. = 3.75mm.
8	" 23	11 20 56	Probably a very distant earthquake. Normal line = 0.2mm. P.T.'s ? D ? 22m. later a max. amp. = 1.9mm.
9	" 29	17 11 57 (17 10 51)	The Java earthquake. Normal line = 0.3mm. P.T.'s = 5.3m. D = 2h. 34m. First max. amp. = 4.0mm. at 17h. 24.5m., and second max. amp. = 4.25mm. at 17h. 29.0m.
10	Oct. 4	9 8 59	A moderate shock. Normal line = 0.3mm. P.T.'s = 1.6m. D = 1h. 10m. 7m. later a max. amp. = 2.9mm.
11	" 10	21 18 15 (21 17 45)	Origin near Tokio. Air tremor present. P.T.'s ? D ? Max. amp. = 8.0mm
12	" 19	9 29 3	A distant earthquake. Normal line = 0.18mm. P.T.'s = 7.5m. D > 1h. 30m. Max. amp. = 4.5mm. at 9h. 44m.
13	" 22	4 27 52	Slight. Normal line = 0.4mm. No clear P.T.'s. D = 3m. At the beginning a max. amp. = 0.35mm.
14	Nov. 2	a 6 3 42(?) b 6 8 58	Slight. Normal line = 0.4mm. For b: D = 6.0m. Max. amp. = 1.2mm.
15	" 7	1 5 29	Slight. Normal line = 0.36mm. P.T.'s = 1.0m. D = 4.0m. 1m. later a max. amp. = 0.35mm.
16	" 10	23 28 55	Slight. Air tremor developed. P.T.'s ? D = 4.0m. At the beginning a max. amp. = 0.65mm.
17	" 11	22 41 47	Moderate. Normal line = 0.36mm. P.T.'s = 1.4m. D = 54m. Max. amp. = 0.6mm. at 22h. 47m.
18	Dec. 3	a 6 32 53 b 6 41 36	Slight. Normal line = 0.3mm. For a: D = 4.0m. Max. amp. = 0.6mm. For b: D = 2.0m. Max. amp. = 0.35mm.
19	" 17	3 40 20	Slight. Normal line = 0.2mm. D = 3.0m. At the beginning a max. amp. = 0.3mm.
20	" 17	6 35 0	Slight. Normal line = 0.2mm. No clear P.T.'s. D = 3.0m. At the beginning a max. amp. = 0.3mm.
21	" 30	23 26 26	Slight. Normal line = 0.3mm. No clear P.T.'s. D = 4.0m. Max. amp. = 0.9mm. at 23h. 26.9m.
22	" 30	10 14 8	Moderate. Normal line = 0.36mm. P.T.'s = 2.4m. D = 37.0m. 5.6m. later a max. amp. = 0.75mm.

## The Tokio Register—continued.

No.	Date	Time of Commencement	Remarks
<b>1900.</b>			
23	Jan. 3	H. M. S. 4 43 25	Slight. Normal line = 0.24mm. D = 3.0mm. At the beginning a max. amp. = 0.35mm.
24	" 11	? (9 8 18)	A distant earthquake. Normal line = 0.32mm. First P.T.'s = 2.2m. Second P.T.'s = 3.0m. D = about 1h. 30m. Amp. = 3.5mm. at the beginning of the proper motion. 5.2m. later a max. amp. = 5.25mm.
25	" 15	5 5 48	Slight. Normal line = 0.2mm. P.T.'s = 25s. D = 8.0m. 1.4m. later a max. amp. = 2.0mm.
26	" 16	3 36 3	Slight. Normal line = 0.25mm. P.T.'s = 1m. D = 7.5m. A max. amp. = 0.65mm. at 3h. 37.1m.
27	" 16	15 14 46	Moderate shock. Air tremor developed; trace not clear. D = 5.0m. A max. amp. = 4.0mm.
28	" 18	7 46 42	Moderate. Normal line = 0.25mm. P.T.'s = 1.5m. D = 25m. 2.3m. later a max. amp. = 0.35mm. 6.1m. later a max. amp. = 0.6mm.
29	" 20	6 52 21 (6 52 20)	A distant earthquake. Normal line = 0.3mm. First P.T.'s = 6.7m. Second P.T.'s = 3.0m. D = about 2h. 30m. A max. amp. = 2.6mm., almost 1 hour later.
30	" 21	9 29 13	Weak. Air tremor developed. P.T.'s ? D = 7.0m. A max. amp. = 3.5mm.
31	" 24	5 17 50	Slight. Air tremor developed. P.T.'s ? D ? 4m. later a max. amp. = 1.5mm.
32	" 30	3 57 32	Slight. Normal line = 0.3mm. P.T.'s ? D = 3.0m. Max. amp. = 0.45mm.
33	Feb. 2	8 6 28	Origin in Miyazaki—i.e. Eastern Kishū. Normal line = 0.2mm. P.T.'s = 8m. D = about 10m. A max. amp. = 0.5mm. at 8h. 8.0m.
34	" 3	4 35 25 (4 30 4)	A slight distant earthquake. Normal line = 0.2mm. P.T.'s = 7.3m. D = 41m. A max. amp. = 0.85mm. at 4h. 45.3m.
35	" 13	2 11 31	Slight. Normal line = 0.3mm. No P.T.'s. D = 4.0m. A max. amp. = 0.35mm.
36	" 13	4 27 55 (4 27 9)	A moderate shock, origin in the Pacific Basin, east of the north-eastern part of Japan. Normal line = 0.3mm. First P.T.'s = 1.2m. Second P.T.'s = 1.1m. D = 22m. A max. amp. = 2.25mm. at 4h. 31.0m.
37	" 17	3 54 0	A weak earthquake, origin in the vicinity of Tokio Bay. Normal line = 0.25mm. D = 7.0m. A max. amp. = 1.2mm.
38	" 17	6 21 30	Slight. Normal line = 0.3mm. No P.T.'s. D = 3.0m. A max. amp. = 0.35mm.

## APPENDIX.—Report of the Central Meteorological Observatory.

## No. 4. Earthquake of September 9, 1899.

Meteorological Stations	Time of Occurrence	Intensity	Character
	H. M. S.		
Akita . . . . .	1 55 32	Slight.	
Mito . . . . .	2 3 7	"	

## No. 6. Earthquake of September 13.

Meteorological Stations	Time of Occurrence	Intensity	Character
	H. M. S.		
Fukushima . . . . .	14 2 25	Slight.	
Tokio . . . . .	14 6 29	"	Windows rattled.
Mito . . . . .	14 6 34	"	
Kumagai . . . . .	14 7 34	"	
Yokohama . . . . .	14 7 52	"	
Choshi . . . . .	14 16 55	"	

## No. 11. Earthquake of October 9.

Meteorological Stations	Time of Occurrence	Intensity	Character
	H. M. S.		
Yokosuka . . . . .	21 18 0	Weak.	Sharp.
Utsunomiya . . . . .	21 18 0	"	Gentle.
Yokohama . . . . .	21 17 53	Slight.	
Kumagai . . . . .	21 18 0	"	
Tokio . . . . .	21 18 2	"	
Mito . . . . .	21 18 2	"	
Numatsu . . . . .	21 18 44	"	Sharp.
Nagoya . . . . .	21 18 45	"	
Choshi . . . . .	21 20 0	"	
Matsumoto . . . . .	21 20 13	"	

## No. 27. Earthquake of January 16, 1900.

Meteorological Stations	Time of Occurrence	Intensity	Character
	H. M. S.		
Yokohama . . . . .	15 9 17	Weak.	Gentle.
Iida . . . . .	15 12 25	"	Houses trembled.
Yokosuka . . . . .	15 14 9	"	
Takayama . . . . .	15 15 0	"	
Hikone . . . . .	15 11 50	Slight.	
Matsumoto . . . . .	15 12 48	"	Gentle.
Osaka . . . . .	15 13 3	"	
Fukushima . . . . .	15 13 16	"	
Mito . . . . .	15 13 53	"	Windows rattled.
Nagoya . . . . .	15 13 54	"	Sharp.
Maebashi . . . . .	15 14 3	"	
Kumagai . . . . .	15 14 5	"	
Tokio . . . . .	15 14 11	"	Sharp.
Kofu . . . . .	15 14 14	"	
Yaki . . . . .	15 23 30	"	

## No. 28. Earthquake of January 18.

Meteorological Stations	Time of Occurrence	Intensity	Character
	H. M. S.		
Tokachi . . . . .	5 45 13	Weak.	Gentle.
Nemuro . . . . .	5 41 10	Slight.	Long.
Fukushima . . . . .	5 44 17	"	
Aomori . . . . .	5 44 20	"	Gentle.
Ishinomaki . . . . .	5 44 30	"	
Tokio . . . . .	5 46 2	"	
Miyako . . . . .	5 58 41	"	

## No. 33. Earthquake of February 2.

Meteorological Stations	Time of Occurrence	Intensity	Character
	H. M. S.		
Miyazaki . . . . .	8 1 15	Weak.	Sharp.
Kagoshima . . . . .	8 2 10	Slight.	Gentle.
Fukuoka . . . . .	8 3 6	"	Long.
Kaga . . . . .	8 4 3	"	"
Kumamoto . . . . .	8 4 32	"	"

## No. 36. Earthquake of February 13.

Meteorological Stations	Time of Occurrence	Intensity	Character
	H. M. S.		
Ishinomaki . . . . .	4 25 48	Slight.	Earthquake sound.
Fukushima . . . . .	4 26 37	"	
Nemuro . . . . .	4 27 45	"	Gentle.
Tokio . . . . .	4 28 19	"	
Utsunomiya . . . . .	4 28 19	"	
Mito . . . . .	4 28 21	"	Windows rattled.
Akita . . . . .	4 29 28	"	
Kumagai . . . . .	4 29 47	"	
Kofu . . . . .	4 29 55	"	Gentle.
Miyako . . . . .	4 31 35	"	Vertical motion present.
Kushiro . . . . .	4 33 5	"	
Aomori . . . . .	4 38 23	"	Gentle.

## No. 37. Earthquake of February 17.

Meteorological Stations	Time of Occurrence	Intensity	Character
	H. M. S.		
Mito . . . . .	3 52 48	Weak.	Sharp.
Utsunomiya . . . . .	3 54 31	"	"
Yokosuka . . . . .	3 55 2	"	"
Yokohama . . . . .	3 54 15	Slight.	Sharp.
Maebashi . . . . .	3 54 46	"	
Kofu . . . . .	3 54 47	"	Gentle.
Tokio . . . . .	3 54 48	"	
Fukushima . . . . .	3 55 11	"	
Kumagai . . . . .	3 55 14	"	

List of Earthquakes recorded by the Gray-Milne Seismograph at the Central Meteorological Observatory of Tokio, for 1899. (Continuation of Catalogue in Reports of the British Association, 1886 to 1899.)

No.	Month	Day	Tokio Mean Time, 9 hrs. in advance of Greenwich	Duration	Direction	Maximum Amplitude and Period of Horizontal Motion		Maximum Amplitude and Period of Vertical Motion		Nature of Shock
						SECS.	MM.	SECS.	MM.	
2,129	I.	29	H. M. S.	M. S.	---	---	---	---	---	slight
2,130	II.	1	1 37 24 A.M.	---	---	---	---	---	---	---
2,131	"	6	4 09 00 A.M.	---	---	---	---	---	---	---
2,132	"	7	9 27 53 A.M.	---	---	---	---	---	---	---
2,133	"	12	1 25 03 A.M.	---	---	---	---	---	---	---
2,134	"	13	3 15 07 A.M.	---	---	---	---	---	---	---
2,135	"	19	4 18 12 P.M.	---	---	---	---	---	---	---
2,136	"	20	7 47 01 A.M.	---	---	---	---	---	---	---
2,137	"	21	1 10 45 A.M.	---	---	---	---	---	---	---
2,138	"	22	8 02 38 A.M.	---	---	---	---	---	---	---
2,139	"	27	2 10 07 P.M.	---	---	---	---	---	---	---
2,140	"	28	11 16 06 P.M.	---	---	---	---	---	---	---
2,141	III.	6	8 11 47 P.M.	---	---	---	---	---	---	---
2,142	"	7	9 55 29 A.M.	---	---	---	---	---	---	---
2,143	"	13	10 52 01 P.M.	---	---	---	---	---	---	slight, slow
2,144	"	18	4 50 27 A.M.	---	---	---	---	---	---	---
2,145	"	18	8 54 25 P.M.	---	---	---	---	---	---	---
2,146	"	22	7 23 00 P.M.	3 49	W.N.W., E.S.E.	3 0	3 6	---	---	slight, slow
2,147	"	22	8 17 57 P.M.	---	---	---	---	---	---	slight
2,148	"	23	1 47 55 A.M.	---	---	---	---	---	---	---
2,149	"	24	1 04 57 P.M.	---	---	---	---	---	---	---
2,150	"	24	6 53 52 P.M.	---	---	---	---	---	---	---
2,151	"	26	6 46 53 A.M.	3 30	N., S.	1 0	0 2	---	---	weak, quick
2,152	"	26	7 16 59 A.M.	---	---	---	---	---	---	slight
2,153	"	26	9 17 13 A.M.	---	---	---	---	---	---	---
2,154	"	29	11 41 32 P.M.	---	---	---	---	---	---	---
2,155	"	30	8 34 06 P.M.	---	---	---	---	---	---	---
2,156	"	31	5 39 59 P.M.	---	---	---	---	---	---	---
2,157	"	31	11 02 57 P.M.	---	---	---	---	---	---	---
2,158	IV.	2	11 19 27 P.M.	---	---	---	---	---	---	---
2,159	"	5	1 01 18 P.M.	1 40	S.S.E., N.N.W.	0 8	1 3	0 7	0 1	weak, quick
2,160	"	6	8 30 22 A.M.	---	---	---	---	---	---	slight
2,161	"	7	0 38 46 A.M.	---	---	---	---	---	---	---
2,162	"	9	5 42 38 P.M.	---	---	---	---	---	---	---
2,163	"	11	10 06 52 A.M.	---	---	---	---	---	---	---
2,164	"	13	4 30 14 A.M.	---	---	---	---	---	---	---
2,165	"	15	0 41 45 A.M.	---	---	---	---	---	---	---
2,166	"	15	7 25 54 P.M.	6 00	W.S.W., E.N.E.	2 3	2 14	0 6	0 13	weak, slow
2,167	"	16	2 28 14 P.M.	---	---	---	---	---	---	slight
2,168	"	19	3 34 49 P.M.	---	---	---	---	---	---	---
2,169	"	20	5 10 50 P.M.	---	---	---	---	---	---	---
2,170	"	24	6 38 20 A.M.	---	---	---	---	---	---	---
2,171	V.	2	0 23 23 A.M.	---	---	---	---	---	---	---
2,172	"	2	1 01 50 A.M.	2 35	N.W., S.E.	0 45	0 34	0 45	0 07	slight, quick
2,173	"	4	10 23 42 A.M.	---	---	---	---	---	---	slight
2,174	"	6	2 09 24 P.M.	1 31	N.W., S.E.	0 5	0 45	0 5	0 01	weak, quick
2,175	"	8	0 28 32 P.M.	6 01	N., S.	1 05	0 37	---	---	slight, slow
2,176	"	10	6 01 44 A.M.	---	---	---	---	---	---	slight
2,177	VI.	2	2 08 33 P.M.	---	---	---	---	---	---	---
2,178	"	5	3 46 24 A.M.	---	---	---	---	---	---	---
2,179	"	5	9 12 26 A.M.	---	---	---	---	---	---	---
2,180	"	6	7 10 30 A.M.	---	---	---	---	---	---	---
2,181	"	10	10 36 58 P.M.	---	---	---	---	---	---	---
2,182	"	15	3 50 55 P.M.	---	---	---	---	---	---	---
2,183	"	17	10 12 45 A.M.	---	---	---	---	---	---	---
2,184	"	18	1 54 55 P.M.	---	---	---	---	---	---	---
2,185	"	21	5 54 53 A.M.	---	---	---	---	---	---	---
2,186	"	21	5 12 41 A.M.	---	---	---	---	---	---	---
2,187	VII.	7	6 53 05 A.M.	2 4	E.S.E., W.N.W.	0 37	0 38	0 51	0 15	slight, quick
2,188	"	11	7 13 09 A.M.	---	---	---	---	---	---	slight
2,189	"	11	4 40 33 P.M.	---	---	---	---	---	---	---
2,190	"	18	1 50 07 A.M.	---	---	---	---	---	---	---
2,191	"	21	6 43 20 P.M.	---	---	---	---	---	---	---
2,192	"	23	4 52 58 A.M.	---	---	---	---	---	---	---
2,193	"	27	2 01 05 P.M.	---	---	---	---	---	---	slight
2,194	VIII.	1	9 38 55 A.M.	---	---	---	---	---	---	---
2,195	"	3	1 35 05 A.M.	---	---	---	---	---	---	---
2,196	"	3	6 51 54 P.M.	3 4	N.E., S.W.	0 8	0 4	---	---	slight, slow
2,197	"	5	9 19 19 A.M.	---	---	---	---	---	---	slight
2,198	"	7	6 01 37 P.M.	---	---	---	---	---	---	---

Catalogue of Earthquakes recorded at Tokio—continued.

No.	Month	Day	Tokio Mean Time, 9 hrs. in advance of Greenwich	Duration	Direction	Maximum Amplitude and Period of Horizontal Motion		Maximum Amplitude and Period of Vertical Motion		Nature of Shock
						SECS.	MM.	SECS.	MM.	
2,199	VIII.	8	H. M. S.	M. S.	---	---	---	---	---	slight
2,200	"	8	2 12 26 A.M.	---	---	---	---	---	---	---
2,201	"	8	9 54 03 P.M.	---	---	---	---	---	---	---
2,202	"	11	7 34 44 A.M.	---	---	---	---	---	---	---
2,203	"	13	6 57 41 A.M.	---	---	---	---	---	---	---
2,204	"	13	2 36 41 P.M.	---	---	---	---	---	---	---
2,205	"	13	8 00 16 P.M.	---	---	---	---	---	---	---
2,206	"	14	8 49 03 A.M.	---	---	---	---	---	---	---
2,207	"	14	6 55 38 P.M.	---	---	---	---	---	---	---
2,208	"	15	0 36 18 P.M.	---	---	---	---	---	---	---
2,209	"	31	6 26 23 A.M.	---	---	---	---	---	---	---
2,210	IX.	2	3 16 00 A.M.	---	---	---	---	---	---	---
2,211	"	2	10 09 03 P.M.	---	---	---	---	---	---	---
2,212	"	7	6 37 23 A.M.	---	---	---	---	---	---	---
2,213	"	9	3 25 53 A.M.	---	---	---	---	---	---	---
2,214	"	9	3 25 53 A.M.	---	---	---	---	---	---	---
2,215	"	13	11 06 29 P.M.	---	---	---	---	---	---	---
2,216	"	18	11 55 18 A.M.	---	---	---	---	---	---	---
2,217	"	27	1 57 57 A.M.	---	---	---	---	---	---	---
2,218	"	29	1 58 27 A.M.	---	---	---	---	---	---	---
2,219	X.	1	11 40 45 A.M.	---	---	---	---	---	---	---
2,220	"	3	2 44 52 P.M.	---	---	---	---	---	---	---
2,221	"	3	6 28 19 P.M.	---	---	---	---	---	---	---
2,222	"	10	6 18 02 A.M.	---	---	---	---	---	---	---
2,223	"	10	6 47 43 P.M.	---	---	---	---	---	---	---
2,224	"	11	6 38 24 P.M.	---	---	---	---	---	---	---
2,225	"	19	6 57 29 A.M.	---	---	---	---	---	---	---
2,226	"	21	10 08 41 P.M.	---	---	---	---	---	---	---
2,227	XI.	5	4 46 32 P.M.	---	---	---	---	---	---	---
2,228	"	7	4 45 54 P.M.	---	---	---	---	---	---	---
2,229	"	10	8 59 02 P.M.	---	---	---	---	---	---	---
2,230	"	11	2 40 45 A.M.	---	---	---	---	---	---	---
2,231	"	15	3 17 57 P.M.	---	---	---	---	---	---	---
2,232	"	17	5 36 33 P.M.	---	---	---	---	---	---	---
2,233	"	18	4 23 14 P.M.	---	---	---	---	---	---	---
2,234	"	19	5 08 52 P.M.	---	---	---	---	---	---	---
2,235	"	21	6 56 49 P.M.	2 20	W., E.	0 7	0 7	---	---	---
2,236	"	23	3 14 09 P.M.	---	---	---	---	---	---	---
2,237	"	23	6 53 19 P.M.	---	---	---	---	---	---	---
2,238	"	25	3 45 41 A.M.	---	---	---	---	---	---	---
2,239	"	25	4 01 55 A.M.	---	---	---	---	---	---	---
2,240	XII.	1	7 14 33 A.M.	---	---	---	---	---	---	---
2,241	"	1	6 03 04 P.M.	---	---	---	---	---	---	---
2,242	"	10	11 22 19 P.M.	---	---	---	---	---	---	---
2,243	"	12	3 43 51 P.M.	---	---	---	---	---	---	---
2,244	"	20	10 47 52 A.M.	2 20	N., S.	0 7	0 6	---	---	slight, quick
2,245	"	25	5 35 17 A.M.	---	---	---	---	---	---	slight
2,246	"	30	3 05 10 A.M.	---	---	---	---	---	---	---
2,247	"	31	9 40 17 A.M.	---	---	---	---	---	---	---