On the Earthquakes recorded by the Pendulum Seismograph at Shillong (Assam) from 1903 to 1931.

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Shortly after the great earthquake of 12th June 1897, a pendulum seismograph was erected at Shillong (lat. 25° 33′ N.; long. 91° 56′ E.) under the supervision of Mr. T. H. D. La Touche. Mr. R. D. Oldham describes the instrument as—

> 'a simple pendulum with a pointer giving an amplification of about 5 times to record the movements on a piece of smoked glass. The movement of the pendulum is not controlled in any way, and the diagrams are consequently a combination of the movements of the ground and the motion communicated to the pendulum; they serve, however, to give a fair idea of the comparative range of motion in the earthquakes recorded by the instrument.'[1]

Mr. La Touche informs me that the times are not recorded by the seismograph, but are entered by the official who attends to it.

In the memoir referred to, Mr. Oldham gives a list of the after-shocks (671 in number) registered from 4th August, 1897, to 31st December, 1898. The records for the years 1899-1902 have not been published and seem to have been dispersed. I am indebted to the kindness of Mr. La Touche for suggesting that the records from 1903 onwards should be placed at my disposal for study, and to the courtesy of the Director, Geological Survey of India for the loan of these valuable photographs.

The series, which closes in May, 1931, is not quite complete. The photographs for nearly a year—29th July, 1908 to 5th July, 1909—are missing, and also those for July to September, 1930. The latter were forwarded to Mr. E. R. Gee for his valuable study of the Dhubri earthquake of 3rd July, 1930[2]. From the covering letters, however, we learn that 13 earthquakes were recorded in July, 5 in August and 2 in September. It should be mentioned that some of the photographs (25 in number) are missing, while a large number, especially of those during the years 1903-1906, are much eaten away by insects.

[1] *Mem. Geol. Surv. Ind.*, XXX, pp. 17-21, (1900)."
[2] *Mem. Geol. Surv. Ind.*, LXV, Pt. I, pp. 1-106, (1934).

In the catalogue that follows, the time of occurrence is given in hours and minutes, local time, which is 6 hours 8 minutes in advance of Greenwich mean time. In the case of missing photographs, the entry is made in the corresponding interval, for the records are arranged in order on the sheets. In the third column, the range given is that of the actual movement of the ground in hundredths of an inch, estimated on the assumption that the record magnifies those movements five times. The addition of a *plus* sign implies that part of the record has been eaten away. In the last column, the direction, or rather line of movement, is measured in degrees from north in clockwise direction. The direction given is that of the average or principal direction, sometimes of the major axis when the record is elliptical in form.

No.	Day.	Time.		Range.	Direction.
		H.	M.		
	1903				
1	Jan. 2 . .	6	19	9	
2	10 . .	9	0	5	
3	28 . .	23	51	8	
4	Feb. 12 . .	6	45	3	
5	15 . .	2	10	5	
6	16 . .	15	0	8	40
7	..	16	15	5	
8	Mar. 8 . .	2	58	8	
9	9 . .	22	50	4	
10	11 . .	..		4	
11	12 . .	4	42	5	0
12	21 . .	6	7	2	145
13	23 . .	..		5	
14	Apr. 15 . .	21	10	5	15
15	19 . .	20	5	8	
16	May 1 . .	17	23	5	40
17	10 . .	22	53	5	40
18	20 . .	10	7	7	
19	21 . .	20	47	9	
20	22 . .	14	52	5	
21	25 . .	5	47	3	
22	27 . .	6	32	1	
23	28 . .	9	31	1	
24	30 . .	23	20	6	
25	31 . .	10	5	2+	
26	June 2 . .	4	55	2	
27	4 . .	5	15	11	
28	13 . .	8	4	4	
29	14 . .	10	19	3	140
30	15 . .	5	57	4	
31	16 . .	13	12	9	
32	18 . .	17	0	9	

No.	Day.	Time.	Range.	Direction.
		H. M.		
	1903			
33	June 20 . .	23 0	5+	
34	..	..	5	
35	..	4 16	3	
36	25 . .	17 2	5	
37	29 . .	21 57	7	140
38	July 1 . .	23 42	5	
39	8 . .	22 52	4	
40	10 . .	..	4	
41	18 . .	6 26	5	
42	19 . .	23 15	4	
43	23 . .	14 6	12	
44	23 . .	17 58	6	70
45	Aug. 3 . .	15 50	4	
46	3 . .	22 50	..	
47	3 . .	22 56	..	
48	5 . .	22 35	5	
49	6 . .	19 5	8	20
50	7 . .	10 2	4	
51	15 . .	19 3	3	
52	..	..	..	
53	17 . .	..	2+	
54	19 . .	10 10	4	
55	..	..	3	145
56	23 . .	22 48	2	
57	24 . .	22 0	2	165
58	Sep. 1 . .	21 19	7	
59	6 . .	20 25	5	
60	6 . .	22 41	21	170
61	11 . .	10 30	2	
62	19 . .	1 42	..	
63	25 . .	13 13	1	
64	Oct. 5 . .	0 51	..	
65	14 . .	6 5	3	
66	14 . .	22 7	4	30
67	15 . .	2 15	4	
68	18 . .	6 26	..	
69	19 . .	5 4	6	60
70	21 . .	2 13	5	
71	23 . .	21 35	8	
72	28 . .	19 57	5	
73	Nov. 16 . .	6 51	8+	
74	16 . .	10 9	8	
75	25 . .	18 49	..	
76	26 . .	23 11	15	
77	27 . .	3 45	5	
78	30 . .	3 48	3	
79	Dec. 1 . .	3 40	2	
80	5 . .	19 58	3	
81	7 . .	..	1	
82	15 . .	23 40	5	
83	19 . .	..	6	
84	24 . .	22 55	2	
85	..	..	3	

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No.	Day.	Time.	Range.	Direction.
		H. M.		
	1904			
86	Jan. 6 . .	10 23	3	
87	13 . .	7 1	4	
88	14 . .	19 20	..	
89	25 . .	5 59	3	
90	29 . .	21 56	..	
91	30 . .	15 37	1	
92	Feb. 1 . .	22 48	5	
93	13 . .	18 25	4	
94	15 . .	12 6	5	
95	16 . .	9 31	6+	
96	22 ? . .	..	..	
97	28 . .	19 31	6	145
98	28 . .	..	5+	
99	Mar. 3 . .	5 42	4	45
100	3 . .	15 6	6	
101	9 . .	12 48	5	
102	14 . .	18 44	..	
103	14 . .	23 58	2	
104	15 . .	0 49	10	
105	16 . .	18 41	3	90
106	17 . .	..	7+	
107	18 . .	21 43	11	50
108	Apr. 4 . .	3 42	6	35
109	4 . .	11 24	4	0
110	4 . .	12 58	8	90
111	6 . .	4 20	10	
112	6 . .	13 2	3	
113	6 . .	22 21	14	
114	7 . .	4 35	6	
115	7 . .	18 48	8+	
116	..	15 50	7	
117	20 . .	16 9	4	
118	21 . .	10 31	3	
119	21 . .	18 5	..	
120	21 . .	18 17	..	
121	22 . .	7 32	4	
122	26 . .	1 50	6	
123	26 . .	3 40	..	
124	26 . .	21 46	3	30
125	28 . .	5 15	6	
126	28 . .	9 10	..	
127	28 . .	11 25	2	
128	May 7 . .	14 42	3	15
129	18 . .	18 20	4	90
130	23 . .	4 53	8	
131	June 18 . .	16 26	6	155
132	19 . .	1 42	3	145
133	20 . .	19 45	7	140
134	22 . .	10 47	6	
135	23 . .	..	2	
136	27 . .	22 42	4	
137	July 1 . .	1 48	7	
138	3 . .	13 30	2	

No.	Day.	Time.	Range.	Direction.
		H. M.		
	1904			
139	July 4 . .	12 15	8	45
140	9 . .	22 14	8	50
141	13 . .	..	..	
142	19 . .	12 29	6	
143	..	..	..	
144	Aug. 11 . .	21 23	5	
145	25 . .	17 2	3	30
146	Sep. 3 . .	15 34	4	0
147	5 . .	3 33	2	155
148	..	..	..	
149	21 or 27 .	16 43	3	
150	..	..	..	
151	Oct. 1 . .	3 45	2	55
152	21 ? . .	11 40	2	
153	25 . .	4 0	6	
154	26 . .	10 59	4	
155	..	..	..	
156	29 . .	1 5	2	95
157	Nov. 5 . .	16 25	..	
158	6 . .	1 47	6	0
159	19 . .	22 54	5+	
160	20 . .	8 58	4	
161	..	..	..	
162	Dec. 8 . .	21 47	18	
163	13 . .	13 13	12	0
	1905			
164	Jan. 2 . .	18 54	6	
165	3 . .	3 15	4	
166	4 . .	3 55	3	
167	7 . .	14 47	6	100
168	11 . .	2 35	..	
169	11 . .	3 15	..	
170	15 . .	..	3	
171	16 . .	18 24	5	
172	21 . .	18 21	5+	20
173	Feb. 13 . .	3 20	4	
174	13 . .	11 43	3	
175	15 . .	3 47	6	
176	22 . .	9 25	3	130
177	25 . .	..	..	
178	25 . .	..	2	
179	Mar. 5 . .	12 39	3	130
180	5 . .	22 6	7	
181	..	..	..	
182	18 . .	13 42	10	
183	..	..	..	
184	20 . .	4 50	6	
185	..	..	..	
186	29 . .	12 45	10	90
187	Apr. 13 . .	13 18	5+	90
188	14 . .	21 6	8	50
189	..	..	..	

No.	Day.	Time. H.	Time. M.	Range.	Direction.
	1905				
190	Apr. 18 . .	6	1	2	
191	..	..		..	
192	25 . .	10	14	3+	
193	..	..		..	
194	May 16 . .	17	34	6	0
195	June 3 . .	17	10	1	50
196	4 . .	15	56	6	75
197	4 . .	18	45	5	
198	..	..		..	
199	19 . .	3	8	8	
200	July 2 . .	10	22	4	40
201	11 . .	12	47	2	90
202	15 . .	14	46	4	
203	16 . .	14	32	1	
204	..	..		..	
205	31 . .	9	18	5	
206	Aug. 6 . .	3	58	7	
207	6 . .	13	12	2+	75
208	8 ? . .	9	11	4	170
209	Sep. 2 . .	2	34	42	0
210	10 . .	20	10	2	
211	23 . .	2	34	54+	0
212	29 . .	18	7	6	
213	..	..		..	
214	Oct. 17 . .	23	32	8	
215	22 . .	21	22	..	
216	29 . .	23	6	6	
217	Nov. 15 . .	3	42	4	
218	16 . .	18	46	3	
219	..	..		..	
220	19 . .	18	20	6	
221	..	..		..	
222	Dec. 9 . .	20	42	4	
223	10 . .	15	2	4	
224	11 . .	..		6	
225	11 . .	22	36	..	
226	12 . .	3	34	9	
227	..	..		..	
228	15 . .	3	5	5	
229	28 . .	..		3	
230	30 . .	1	15	5	
	1906				
231	Jan. 5 . .	19	35	6	55
232	9 . .	3	10	6	
233	12 . .	23	32	8	
234	13 . .	7	21	5	
235	15 . .	14	13	12	
236	18 . .	..		.	
237	20 . .	8	20	2	
238	23 . .	8	27	6	
239	26 . .	..		40	20
240	31 . .	4	46	8	

No.	Day.	Time.	Range.	Direction.
		H. M.		
	1906			
241	Feb. 1 . .	14 25	3	5
242	3 . .	4 27	7	
243	7 . .	4 20	3	
244	12 . .	3 20	4	
245	14 . .	4 18	..	
246	14 . .	15 55	9	55
247	..	..	..	
248	..	..	..	
249	18 . .	4 45	<1	
250	18 . .	17 30	<1	
251	Apr. 2 . .	10 40	4	0
252	5 . .	11 42	2	
253	8 . .	..	..	
254	9 . .	..	5	110
255	11 . .	..	..	
256	23 . .	16 0	12	
257	May	..	..	
258	10 . .	0 40	8	
259	12 . .	11 18	28	
260	21 . .	1 30	3	0
261	23 . .	12 0	3	
262	23 . .	21 28	6	
263	24 . .	3 17	2	
264	..	..	..	
265	25 . .	9 15	3+	
266	25 . .	20 22	14	
267	26 . .	9 15	15	
268	June 6 . .	23 43	5	10
269	7 . .	4 59	2	
270	10 . .	6 20	4	45
271	13 . .	19 58	4	35
272	14 . .	19 51	..	
273	19 . .	17 16	..	
274	27 . .	2 5	4	
275	27 . .	14 50	3	35
276	July 5 . .	13 50	34	
277	9 . .	7 20	4	0
278	..	..	..	
279	10 . .	..	9+	
280	Aug.	..	23	10
281	31 . .	17 25	23	
282	Sep. 1 . .	10 54	8	
283	2 . .	0 32	9	
284	2 . .	5 6	4	120
285	Oct. 16 . .	0 21	..	
286	24 . .	3 45	4	
287	25 . .	2 35	..	
288	25 . .	5 15	..	
289	Nov.	9 35	4	145
290	15 . .	23 32	4+	
291	17 . .	13 35	12	
292	17 . .	13 0	2	
293	19 . .	18 48	6	

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No.	Day.	Time.		Range.	Direction.
		H.	M.		
	1906				
294	Nov. 21 . .	19	38	17	
295	30 . .	3	50	5	
296	30 . .	6	58	..	
297	Dec. 5 . .	22	25	10	
298	12 . .	20	42	8	
299	13 . .	19	3	4	
300	14 . .	6	10	4	
301	18 . .	22	56	3	
302	19 . .	4	58	9	
303	21 . .	22	52	5	
304	22 . .	2	38	10	135
305	22 . .	15	42	7	
306	24 . .	9	11	7	
	1907				
307	Jan. 4 . .	19	25	<1	
308	6 . .	1	57	4	
309	7 . .	20	10	2	
310	8 . .	5	16	5	
311	8 . .	10	50	6	70
312	9 . .	22	26	4	115
313	10 . .	2	57	5	
314	11 . .	7	13	3	50
315	15 . .	23	2	1	0
316	16 . .	4	33	3	125
317	21 . .	1	13	4	160
318	22 . .	5	2	4	
319	22 . .	20	17	8	
320	26 . .	4	15	2	80
321	28 . .	5	10	..	
322	28 . .	16	29	12	
323	30 . .	5	15	8	140
324	31 . .	19	25	4	
325	31 . .	21	39	6	
326	31 . .	23	20	6	10
327	Feb. 1 . .	5	42	6	
328	6 . .	4	15	8	
329	6 . .	22	25	4	
330	20 . .	6	11	5	0
331	24 . .	1	18	4	145
332	25 . .	8	46	3	
333	26 . .	13	25	8	
334	27 . .	7	50	4	
335	27 . .	10	28	5	
336	Mar. 2 . .	22	19	14	
337	4 . .	3	40	7	40
338	14 . .	5	9	1	
339	17 . .	16	15	4	
340	18 . .	1	10	5	140
341	22 . .	23	16	5	50
342	Apr. 4 . .	19	2	2	90
343	5 . .	13	38	5	50
344	7 . .	16	49	..	

No.	Day.	Time.		Range.	Direction.
		H.	M.		
	1907				
345	Apr. 7 . .	17	0	..	
346	13 . .	9	5	3	
347	13 . .	19	48	6	
348	19 . .	16	36	6	
349	19 . .	19	26	2	
350	26 . .	12	32	10	130
351	26 . .	15	39	2	110
352	29 . .	8	56	4	150
353	30 . .	21	18	6	
354	30 . .	22	35	8	
355	May 8 . .	21	2	4	
356	June 2 . .	11	52	4	
357	5 . .	4	58	5	
358	10 . .	11	19	4	
359	13 . .	14	42	5	
360	14 . .	6	35	2	90
361	25 . .	7	15	7	
362	July 8 . .	5	48	14	
363	11 . .	22	5	11	
364	15 . .	3	22	6	
365	26 . .	11	59	18	
366	Aug. 2 . .	18	3	7	165
367	3 . .	4	2	12	
368	8 . .	2	38	10	
369	22 . .	5	15	4	
370	22 . .	10	18	2	
371	Sep. 7 . .	1	26	4	
372	7 . .	8	57	8	
373	19 . .	14	29	6	
374	27 . .	15	58	2	
375	Oct. 11 . .	19	40	4	
376	14 . .	21	15	4	
377	19 . .	16	50	3	
378	27 . .	21	55	4	0
379	Nov. 21 . .	11	35	6	
380	22 . .	10	23	5	
381	30 . .	17	35	18	0
382	Dec. 7 . .	16	14	5	
383	15 . .	9	10	3	
384	17 . .	12	30	4	
385	22 . .	17	35	3	
386	29 . .	19	29	4	
	1908				
387	Jan. 2 . .	16	2	4	
388	5 . .	21	11	17	
389	11 . .	12	31	5	
390	13 . .	22	24	3	
391	19 . .	5	11	4	0
392	25 . .	1	50	2	
393	Feb. 1 . .	20	15	3	135

No.	Day.	Time.		Range.	Direction.
		H.	M.		
	1908				
394	Feb. 13 . .	23	10	5	
395	19 . .	23	30	7	
396	Mar. 6 . .	16	57	12	
397	12 . .	21	10	3	115
398	14 . .	19	10	3	145
399	14 . .	22	35	8	155
400	15 . .	20	45	4	130
401	17 . .	10	58	6	
402	17 . .	12	32	5	45
403	22 . .	6	1	4	
404	22 . .	23	2	12	
405	30 . .	21	5	10	
406	31 . .	4	10	4	145
407	Apr. 4 . .	11	44	<12	
408	4 . .	12	12	10	45
409	4 . .	13	5	1	0
410	4 . .	20	7	12	145
411	13 . .	22	30	2	130
412	18 . .	6	10	4	110
413	27 . .	19	5	5	110
414	May 2 . .	13	24	5	125
415	7 . .	18	30	4	120
416	12 . .	20	15	3	130
417	29 . .	1	13	16	
418	29 . .	23	45	4	
419	June 1 . .	5	50	1	65
420	1 . .	6	49	1	
421	17 . .	11	40	6	
422	22 . .	17	30	14	
423	23 . .	19	10	3	
424	July 18 . .	16	50	3	135
425	22 . .	0	46	2	
426	25 . .	9	12	5	125
427	29 . .	0	12	4	
	1909				
428	July 5 . .	6	31	5	120
429	5 . .	13	56	11	
430	14 . .	19	5	6	
431	26 . .	20	42	7	
432	Aug. 11 . .	4	26	4	
433	30 . .	6	18	3	
434	Sep. 18 . .	5	15	3	
435	26 . .	7	35	2	
436	28 . .	15	40	4	
437	Oct. 7 . .	5	40	9	145
438	12 . .	12	30	2	
439	12 . .	19	25	6	
440	15 . .	18	5	8	
441	20 . .	6	15	3	
442	29 . .	8	15	16	
443	Nov. 7 . .	15	0	..	
444	17 . .	6	5	10	145

No.	Day.	Time.		Range.	Direction.
		H.	M.		
	1909				
445	Nov. 19 . .	4	45	4	
446	Dec.	..		4	
447	17 . .	12	30	7	
	1910				
448	Jan. 5 . .	7	30	4	
449	8 . .	1	30	4	
450	Feb. 4 . .	11	0	8	125
451	21 . .	5	40	3	140
452	Mar. 2 . .	4	5	3	
453	Apr. 25 . .	17	10	4	150
454	May 17 . .	8	35	6	150
455	June 10 . .	20	10	12	
456	17 . .	22	13	3	140
457	July 1 . .	17	40	3	
458	2 . .	16	25	6	
459	6 . .	15	8	32	40
460	Aug. 1 . .	7	15	5	
461	Sep. 6 . .	19	18	5	155
462	22 . .	9	30	3	145
463	Oct. 27 . .	2	30	..	
464	Nov. 1 . .	1	10	..	
465	17 . .	20	30	..	
466	Dec. 18 . .	17	10	8	
467	22 . .	18	33	11	
	1911				
468	Jan. 3 . .	1	40	25	0
469	5 . .	17	55	5	
470	29 . .	21	55	8	
471	Feb. 5 . .	0	20	9	
		or 0	26		
472	20 . .	19	35	6	160
473	Mar. 2 . .	11	30	5	140
474	11 . .	15	25	3	
475	Apr. 11 . .	12	34	4	105
476	11 . .	22	4	4	
477	24 . .	14	23	4	150
478	29 . .	12	10	5	
479	May 19 . .	2	13	6	145
480	June 3 . .	7	3	26	5
481	July 2 . .	13	0	1	
482	6 . .	16	17	3	140
483	Aug.	..		..	
484	22 . .	14	5	7	15
485	Sep.	..		..	
486	Oct. 20 . .	11	4	1	150
487	21 . .	6	35	1	175
488	Nov. 11 . .	12	10	..	
489	22 . .	5	50	2	145
490	Dec. 14 . .	0	5	15	

No.	Day.	Time. H.	Time. M.	Range.	Direction.
	1912				
491	Jan. 16 . .	3	45	3	
492	Feb. 18 . .	6	38	6	
493	Mar. 9 . .	12	10	2	
494	31 . .	9	50	1	
495	Apr. 9 . .	9	43	8	130
496	May 26 . .	20	45	2	
497	June 1 . .	4	45	6	115
498	7 . .	5	52	3	
499	13 . .	9	55	6	115
500	25 . .	19	52	2	35
501	July 1 . .	16	5	2	45
502	Aug. 5 . .	21	30	4	125
503	24 . .	16	20	2	
504	Sep. 7 or 17 .	12	30	..	
505	24 . .	..		2	
506	Oct. 19 . .	2	20	3	
507	Nov. 18 . .	17	5	4	
508	Dec. 29 . .	3	30	4	
	1913				
509	Jan. 31 . .	23	0	10	
510	Feb. 9 . .	7	30	..	
511	16 . .	5	24	7	
512	28 . .	15	48	1	
513	Mar. 10 .	20	30	14	
514	Apr. 16 . .	..		5	
515	May 20 . .	5	15	6	120
516	June 27 . .	16	25	5	
517	July 17 . .	10	20	3	125
518	Aug. 2 . .	6	0	4	
519	Sep. 10 . .	8	25	2	
520	23 . .	5	30	5	130
521	Oct. 15 . .	17	12	3	
522	Nov. 10 . .	8	18	3	130
523	Dec. 24 . .	15	10	3	130
	1914				
524	Jan. 7 . .	9	25	4	155
525	Feb. 10 . .	5	30	11	125
526	June 22 . .	6	10	4	
527	July 16 . .	1	15	5	140
528	Sep. 16 . .	4	25	8	100
529	Oct. 28 . .	5	30	7	
530	Nov. 5 . .	12	30	8	
531	13 . .	7	20	10	
	1915				
532	Jan. 3 . .	12	35	22	105
533	18 . .	20	22	40	
534	Feb. 9 . .	9	45	8	
535	Mar. 28 . .	14	18	26	135
536	Apr. 13 . .	14	31	9	
537	May 7 . .	1	20	20	95

No.	Day.	Time.		Range.	Direction.
		H.	M.		
	1915				
538	May 10 . .	12	37	12	
539	July 20 . .	2	13	30	90
540	23 . .	3	31	18	
541	31 . .	21	40	16	
542	Aug. 13 . .	2	45	14	120
543	Sep. 7 . .	1	30	31	
544	19 . .	11	12	16	95
545	Oct. 17 . .	23	12	9	
546	Nov. 14 . .	7	22	22	
547	25 . .	15	0	21	
548	Dec. 5 . .	8	30	18	
	1916				
549	Feb. 20 . .	8	4	18	
550	Mar. 18 . .	17	15	18	130
551	May 5 . .	1	45	11	
552	23 . .	1	25	11	
553	June 26 . .	10	13	20	15
554	July 10 . .	10	8	8	
555	14 . .	9	30	12	
556	15 . .	4	13	3	125
557	25 . .	8	9	10	
558	Aug. 13 . .	4	50	13	
		or 9	50		
559	Sep. 6 . .	22	5	..	
560	Oct. 23 . .	7	0	7	
561	Nov. 26 . .	3	25	12	20
562	29 . .	21	5	11	140
563	Dec. 2 . .	9	15	8	145
	1917				
564	Jan. 7 . .	1	15	6	140
565	Feb. 24 . .	9	4	9	145
566	Mar. 28 . .	8	3	11	150
567	Apr. 28 . .	11	22	24	
568	May 20 . .	10	57	9	140
569	June 27 . .	13	42	8	
570	Aug. 14 . .	20	37	10	
571	Sep. 12 . .	15	29	16	
572	Oct. 20 . .	9	6	14	
573	Nov. 25 . .	11	50	24	
574	Dec. 4 . .	3	32	14	
575	15 . .	22	8	15	
	1918				
576	Jan. 26 . .	2	0	18	
577	Feb. 5 . .	3	10	34	
578	Mar. 31 . .	2	20	18	
579	May 15 . .	5	25	16	
580	June 3 . .	9	54	16	
581	July 8 . .	16	30	54	
582	10 . .	11	35	26	
583	11 . .	9	30	23	

No.	Day.	Time. H.	Time. M.	Range.	Direction.
	1918				
584	July 18 . .	2	7	18	
585	Aug. 20 . .	4	7	14	
586	Sep. 20 . .	8	50	15	
587	Oct. 5 . .	19	23	10	
588	Nov. 24 . .	4	12	12	
589	Dec. 21 . .	7	3	13	160
590	28 . .	3	2	10	
	1919				
591	Jan. 21 . .	12	50	12	10
592	Mar. 27 . .	1	28	8	
593	Apr. 12 . .	12	3	6	
594	May 9 . .	12	37	12	
595	June 23 . .	18	22	7	
596	Aug. 21 . .	22	23	14	
597	Oct. 1 . .	0	25	8	
598	26 . .	5	27	11	
599	Nov. 10 . .	20	32	8	
	1920				
600	Jan. 7 . .	5	3	10	
601	Feb. 16 . .	13	25	11	
602	Mar. 8 . .	3	15	8	145
603	Apr. 6 . .	12	45	12	
604	May 30 . .	4	18	10	
605	July 11 . .	21	3	14	
606	Aug. 7 . .	3	4	9	
607	Sep. 15 . .	23	5	9	
608	Oct. 25 . .	21	15	12	
609	Nov. 14 . .	12	31	16	
610	18 . .	20	53	14	
	1921				
611	Jan. 23 . .	3	5	9	
612	Feb. 20 . .	20	40	15	90
613	Mar. 15 . .	5	2	19	65
614	May 13 . .	4	35	4	
615	June 9 . .	11	8	5	
616	Aug. 9 . .	21	52	6	
617	14 . .	18	17	7	160
618	Oct. 8 . .	7	26	5	
	1922				
619	Mar. 12 . .	14	0	5	0
620	13 . .	6	0	4	170
621	16 . .	20	30	4	
622	Apr. 16 . .	18	35	10	5
623	May 25 . .	5	0	5	95
624	29 . .	5	0	6	95
625	June 30 . .	23	30	3	
626	July 7 . .	21	48	3	
627	Sep. 8 . .	18	45	18	165
628	11 . .	15	25	4	130

No.	Day.	Time.		Range.	Direction.
		H.	M.		
	1922				
629	Sep. 14 . .	13	20	2	0
630	Oct. 2 . .	13	34	3	20
631	21 . .	12	55	2	
632	Nov. 3 . .	13	5	4	50
633	Dec. 21 . .	11	53	4	50
	1923				
634	Mar. 27 . .	9	15	1	75
635	Apr. 29 . .	1	10	2	40
636	May 10 . .	..		..	
637	June 27 . .	13	50	2	75
638	July 27 . .	7	25	4	75
639	Aug. 1 . .	13	38	1	
640	10 . .	22	6	6	100
641	19 . .	19	35	4	
642	26 . .	17	38	4	
643	Sep. 10 . .	4	13	53	155
644	Nov. 22 . .	1	51	5	165
	1924				
645	Apr. 30 . .	2	20	2	
646	May 3 . .	10	6	..	
647	27 . .	12	55	..	
648	June 30 . .	23	22	2	60
649	Sep. 13 . .	13	10	2	
650	Dec. 16 . .	16	26	2	170
	1925				
651	Jan. 3 . .	14	56	1	
652	19 . .	14	30	2	0
653	Feb. 23 . .	15	0	1	
654	27 . .	9	6	2	
655	Mar. 29 . .	19	13	2	150
656	Nov. 19 . .	12	51	1	155
657	Dec. 13 . .	6	6	5	60
	1926				
658	Feb. 19 . .	2	20	1	130
659	May 10 . .	14	28	2	75
660	June 20 . .	15	45	1	
661	July 10 . .	21	22	2	45
662	Sep. 19 . .	6	10	1	
663	Oct. 4 . .	16	57	1	
664	23 . .	20	38	3	
665	Nov. 19 . .	13	54	2	90
666	20 . .	22	22	1	90
	1927				
667	Feb. 13 . .	9	39	9	10
668	Mar. 15 . .	23	5	2	5
669	Aug. 17 . .	6	18	1	

No.	Day.	Time.		Range.	Direction.
		H.	M.		
	1928				
670	Jan. 1 . .	21	35	..	
671	30 . .	13	5	1	
672	Apr. 21 . .	11	42	..	
673	Nov. 15 . .	21	44	1	
	1929				
674	Feb. 25 . .	13	30	2	
675	Sep. 8 . .	14	48	2	145
676	Dec. 2 . .	23	50	..	
677	29 . .	13	20	1	
	1930				
678	Nov. 3 . .	23	5	2	120
679	4 . .	13	25	2	150
680	Dec. 6 . .	23	51	2	55
681	8 . .	..		2	110
682	13 . .	23	15	1	10
	1931				
683	Jan. 18 . .	19	30	2	155
684	Feb. 9 . .	15	27	<1	95
685	Apr. 23 . .	10	15	1	135
686	May 20 . .	14	45	<1	

One of the most interesting features of this catalogue is the decline in seismic activity in Assam after the Great Earthquake of 1897. It seems unnecessary to illustrate this decline by a diagram, for, with the usual oscillations, it follows the normal hyperbolic law. The figures for the different years may, however, be given. In 1898, 486 were recorded, and, in successive years from 1903 to 1907, 85, 78, 67, 76 and 80. From 1910 to 1930, the annual numbers were 20, 23, 18, 15, 8, 17, 15. 12, 15, 9, 11, 8, 15, 11, 6, 7, 9, 3, 4, 4 and 25. The lists for 1908 and 1909 are incomplete: in the earlier year, 41 were recorded from 1st January to 29th July, and, in the later, 20 from 5th July to 31st December. Thus, the year 1908 seems to belong to the series 1903-1907, while the year 1909 probably occupies an intermediate position between the series 1903-1907 and 1910-1929. Assuming that the annual numbers of both series follow the law expressed by the equation xy=constant, where y is the number of earthquakes recorded during the year the middle of which is x years from the date of the 1897 earthquake, for the interval 1898-1905, the equation is xy=520, and, for the interval 1898-1907, xy=594. For the interval 1910-1919, the equation is xy=257; for the interval 1920-1929, xy=222; and,

for the interval 1910-1929, xy=239. Thus, a distinct break occurs after the year 1907.

It will be noticed that the range of motion was unusually large in some of these earthquakes. It exceeded half an inch in three of them, namely, those of 23rd September, 1905, 8th July, 1918, and 16th September, 1923. The second of these earthquakes is the Srimangal earthquake on which Dr. Murray Stuart has contributed a valuable study; and the third also had its centre in Assam, in lat. 25·5°N., long. 91·5°E., or at a point about 30 miles west of Shillong.[1] In fourteen others, the range lay between one-quarter and one-half an inch, but, with the exception of the earthquake of 4th April, 1908, none of them seems to have been recorded so far as Italy. Thus, it seems probable that all the earthquakes recorded at Shillong from 1903 to 1930 originated in the province of Assam.

With regard to the exact positions of the epicentres, the Shillong records cannot be expected to throw much light. Certain lines of movement, however, occur rather frequently, especially those directed about north, east and N.-145°E. In his interesting analysis of the after-shocks of the earthquake of 1897, Count de Montessus de Ballore has determined the approximate positions of 5319 epicentres up to 31st December, 1898.[2] Three of those most frequently in action lie near Gauhati to the north of Shillong, Tura to the west, and Goalpara about S.-147°W. It is worthy of notice that the three directions mentioned form about the same percentage of the total number of directions in each of the intervals 1903-1905, 1906-1907, 1908-1915 and 1916-1929. Thus, it is probable that these three great centres retained their predominance of activity for thirty years or more after the earthquake of 1897.

Besides the decline in frequency since 1897, there are several periodic variations of frequency, three periods—the annual, diurnal and fortnightly lunar periods—being clearly manifested.

Owing to the gap in the series during the years 1908 and 1909, these years must be omitted in examining the annual period. The results for the two principal intervals are as follows:—

Interval.	Number of earthquakes.	Epoch.	Ampl.
1903-1907 . . .	386	Feb. (end)	·25
1910-1929 . . .	229	Aug. (end)	·11

[1] *Mem. Geol. Surv. Ind.*, XLVI, pp. 1-70, (1920); Intern. Seis. Sum. for 1923.
[2] *Mem. Geol. Surv. Ind.*, XXXV, pp. 12-23, (1904).

For the diurnal period, the whole series from 4th August, 1897, to 31st December, 1898, and 1903-1929 may be used. The results for different intervals are given in the following table :—

Interval.	Number of earthquakes.	Epoch.	Ampl.
1897-1898 . . .	670	1 a.m.	·22
1903	75	1 a.m.	·65
1904-1905 . . .	118	about 11 p.m.	·24
1906-1907 . . .	144	1 a.m.	·27
1908-1915 . . .	157	11 a.m.	·16
1916-1929 . . .	127	8½ a.m.	·28

For the lunar periods, we may use the earthquakes of the complete lunations from 28th August, 1897 to 13th December, 1898, from 28th January, 1903 to 28th July, 1908, and from 11th July, 1909 to 30th December, 1929. The results are given in the following table, in which the letters N and F imply that the maximum epochs occurred at, or close to, the times of new and full moon, respectively.

Interval.	Number of earthquakes.	Period days.	Epoch.	Ampl.
1897-1898 . .	623	29·6	F	·22
		14·8	N, F	·08
1903-1908 . .	367	29·6	F	·06
		14·8	N, F	·24
1909-1929 . .	239	29·6	N	·11
		14·8	..	..

The study of the earthquakes recorded at Shillong thus lead to the following conclusions :—

(i) At the end of 10 or 11 years after the Great Earthquake of 1897, the rate of decline in frequency is interrupted and renewed at about half the rate.

(ii) After the lapse of about 10 or 11 years, the maximum epoch of the annual period is reversed.

(iii) After the same interval, the maximum epoch of the diurnal period is reversed. During those years (1897-1907), it occurred at the usual time for after-shocks, afterwards at the normal time for ordinary earthquakes.

There is, moreover, the usual association of the midnight diurnal maximum with the winter annual maximum and of the noon diurnal maximum with the summer annual maximum.

(iv) After about the same interval, the maximum epoch of the lunar monthly period (29·6 days) is reversed, and that of the lunar fortnightly period (14·8 days) also shows a tendency, though not quite decided, towards reversal.

(v) The times of the maximum epochs reveal the directions of the crust-movements to which the earthquakes were mainly due. The annual and diurnal periods seem to be connected with the corresponding periods in the variation of atmospheric pressure, the maximum epochs of which occur about midwinter and midnight. During the first interval of ten or eleven years, the annual and diurnal periods of earthquake frequency agree with those of atmospheric pressure. The displacements of the crust were, therefore, at this time mainly downwards, and, after the great upheaval that caused the earthquake of 1897, the crust would naturally settle towards its old position. And this inference is confirmed by the occurrence of the maximum epoch of the lunar monthly period at about the time of full moon. During the second interval (1909-1929), the epochs of all three periods are reversed, showing that the crust-movements to which the later earthquakes were due were once more taking place upwards.

Thus, the Shillong earthquakes ceased to be true after-shocks of the 1897 earthquake after about ten years; the next year or two formed a transitional interval; but, from 1909 onwards, the crust-movements of Assam resumed their original character and may in course of time end in another great destructive earthquake.