

RECORD OF YOKOHAMA EARTHQUAKES,

1890-1894.

By E. J. PEREIRA.

The following list of earthquakes experienced in Yokohama during the years 1890-1893, and from 1st January to 10th May, 1894, is a continuation of the tables published in 1890, in volume XV. of the Transactions of the Seismological Society of Japan.

I regret that the record for the year 1891 is incomplete, owing to my eight months' absence from Japan. That year is memorable for the terrible and disastrous earthquake experienced on the 28th October at 7 o'clock a.m.; a few days before my return to Yokohama. The account of this earthquake, which caused such destruction in Gifu, Nagoya, and neighbouring towns, has been described by Professors Milne, *Seis. Jour.* Vol. I.

I also regret not being able to give the directions of the earthquakes, as I have not been able to get a seismometer conveniently mounted :—

Number of Shocks.	1890.	1891.	1893.
January	4	3	2
February.....	8	5	2
March	3	2	4
April	9	3	3
May.....	6	1	1
June	2	—	6
July	4	1	—
August	4	—	3
September	3	2	5
October	6	1	—
November	3	4	1
December	3	2	4
Total	55	24	31
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1890.

Date.	Time.	Direction.	Date of moon.	High tide.	Remarks.
Jan. 7th	3.35 p.m.	E.S.E.	17	6.27 p.m.	Light.
12th	4.15 a.m.	N.E.-S.W.	22	9.02 a.m.	Light.
17th	5.20 p.m.	E.-W.	27	1.31 p.m.	Light.
29th Feb.	11.30 p.m.	N.E.-S.W.	9	Midnight	Light.
10th	6.20 a.m.	E.-W.	20	8.40 a.m.	Light (cloudy).
11th	11.40 a.m.	N.E.-S.W.	21	9.14 a.m.	Light (cloudy).
13th	9.50 p.m.	N.W.-S.E.	23	11.06 p.m.	Light.
18th	5.30 a.m.	E.S.E.	28	4.13 a.m.	Light (drizzling).
18th	9.45 a.m.	N.W.-S.E.	28	4.13 a.m.	Light.
18th	11.15 a.m.	N.W.-S.E.	28	4.13 a.m.	Light.
21st	2.45 a.m.	—	3	6.44 a.m.	Light.
24th March	0.55 a.m.	N.E.-S.W.	6	9.05 p.m.	Light (raining).
7th	4.23 a.m.	—	16	6.10 a.m.	Very foggy.
11th	7.50 p.m.	N.E.-S.W. and N.W.-S.E.	21	8.30 p.m.	Two shocks.
26th April	6.59 a.m.	N.E.-S.W.	6	8.49 a.m.	Light.
5th	Noon ?	N.E.-S.W.	16	5.59 a.m.	Light.
16th	9.35 p.m.	S.E.-N.W.	27	3.18 p.m.	Two shocks, strong (raining).
17th	4.55 a.m.	S.E. or E.S.E.	28	3.48 a.m.	Foggy, therm. 65, barom. 764.
17th	5.09 a.m.	S.E.-N.W.	28	3.48 a.m.	Foggy, therm. 65, barom. 764.
17th	6.40 a.m.	S.E.-N.W.	28	3.48 a.m.	Foggy, therm. 65, barom. 764.
17th	10.19 p.m.	S.E.-N.W.	28	4.13 p.m.	Two shocks, strong; fine, bar. rising 771.
18th	7.15 p.m.	S.E.-N.W.	29	4.59 p.m.	Light, weather fine, barom. falling.
18th	11.00 p.m.	S.?	29	4.59 p.m.	Very light.
27th May	—	S.E.	9	10.29 a.m.	Very light.
14th	5.00 a.m.?	S.E.	25	1.05 a.m.	Long & very slight.
15th	2.20 p.m.	E.-W.	26	2.52 p.m.	Long & very slight.
15th	3.20 p.m.	E.S.E.	26	2.52 p.m.	Very long and strong.
20th	12.02 p.m.	S.E.	3	5.54 p.m.	Two shocks, very gentle.
21st	12.13 p.m.	S.E.	4	7.05 p.m.	Sharp.
24th	1.42 p.m.	E.E.N.	7	8.34 a.m.	Sharp in Tokyo; prolonged here.

Date.	Time.	Direction.	Date of moon.	High tide.	Remarks.
June 15th	4.28 p.m.	—	29	4.06 p.m.	Very gentle (two shocks).
28th	4.58 a.m.	E.W. & E.S.E.	12	0.44 a.m.	Ending with concussion (vertical) E.S.E.-W.N.W. calm, raining.
July 3rd	about 11 p.m.	S.S.E. and S.	17	5.52 p.m.	Oscillations.
15th	8.14 p.m.	E.-W.	29	4.34 p.m.	Very slight (vertical).
17th	10.00 p.m.?	E.-W.	1	5.58 p.m.	Time not taken.
20th	9.13 a.m.	S.E.-W.-W.	4	7.25 a.m.	Very slight.
Aug. 3rd	4.47 a.m.	—	18	6.58 a.m.	One shock, very gentle & sudden.
5th	1.55 p.m.	S.E.-N.W.-E.W.	20	8.34 p.m.	Strong.
11th	2.00 p.m.	E.-W.	26	2.17 p.m.	Slight.
30th	4.30 a.m.	E.-W.	16	5.07 a.m.	Slight (during the gale).
Sept. 5th	7.50 p.m.	E.W.-S.E.-N.W.	22	9.47 p.m.	Slight, but prolonged.
6th	0.14 a.m.	E.W.-N.E.-S.W.	23	9.47 p.m.	Smart, stronger, wind blowing.
20th	—	—	7	8.59 p.m.	Rainy and hot.
Oct. 7th	4.45 p.m.	—	24	11.24 a.m.	Cloudy (therm. 65).
10th	9.30 a.m.	—	27	3.30 p.m.	Fine (therm. 66).
15th	4.00 a.m.	—	2	6.05 a.m.	Fine, strong, N. gale.
15th	5.50 p.m.	—	2	6.21 p.m.	Cloudy.
17th	8.40 p.m.	—	4	7.26 p.m.	Cloudy.
19th	2.00 p.m.	—	6	8.39 p.m.	Fine (therm. 58).
Nov. 5th	1.00 a.m.	N.E.-S.W.	23	10.16 p.m.	Rain (therm. 55).
14th	2.22 a.m.	N.E.-S.W. and E.W.	3	6.09 a.m.	Strong shock with rumbling noise preceding, 16 sec. about.
25th	7.02 p.m.	E. O.	14	4.28 p.m.	Long.
Dec. 11th	5.40 p.m.	N.S.	30	4.46 p.m.	Pretty long.
12th	—	—	1	5.28 p.m.	—
24th	7.28 a.m.	prob. S.E. N.O.	13	3.42 a.m.	Long and gentle, southerly gale sprung up a few minutes after.

1891.

Date.	Time.	Direction.	Date of moon.	High tide.	Remarks.
Jan. 30th	—	N.E.-S.W.	—	—	—
Feb. 13th	6.35 a.m.	—	5	8.29 a.m.	—
13th	7.04 a.m.	—	5	8.29 a.m.	—
14th	10.20 a.m.	—	6	9.11 a.m.	—
14th	about 4.30 p.	—	6	9.32 p.m.	—
March 1st	4.20 p.m.	—	21	8.52 p.m.	—
Nov. 23rd	1.10 a.m.	—	—	—	Light.
Dec. 24th	5.35 a.m.	S.W.-N.E.	—	—	Strong.
24th	7.00 p.m.	—	—	—	Slight.

1892.

Jan. 17th	11.35 p.m.	—	19	7.49 p.m.	Lasted fully 1 minute.
20th	6.15 a.m.	—	22	9.13 a.m.	Slight.
31st	10.20 a.m.	N.W.-S.E.	3	6.33 a.m.	15 to 20 S., Pretty strong.
Feb. 13th	a.m.	N.W.-S.E.	17	6.03 a.m.	Light.
15th	1.35 a.m.	—	19	7.27 p.m.	Light.
15th	3.15 a.m.	—	19	7.12 a.m.	Light.
21st	a.m.	—	25	10.21 a.m.	Light.
21st	3.45 a.m.	—	25	10.21 a.m.	Light.
March 20d	(12).40 a.m.	—	3	7.58 p.m.	Light.
3rd	3.25 a.m.	—	4	8.38 p.m.	Pretty strong.
April 12th	5.00 a.m.	—	15	5.09 a.m.	Slight.
19th	6.40 a.m.	—	22	8.37 a.m.	Slight.
22nd	1.30 a.m.	—	25	11.00 p.m.	Smart.
May 11th	6.39 a.m.	—	16	5.09 a.m.	Slight (rainy).
July 28th	6.00 a.m.	—	6	8.13 a.m.	Slight (fine).
Sept. 6th	5.45 a.m.	—	15	4.53 a.m.	Slight.
13th	11.00 p.m.	—	22	10.00 p.m.	Slight.
Oct. 19th	12.50 p.m.	—	29	5.12 a.m.	Slight.
Nov. 15th	11.00 p.m.	—	26	2.54 p.m.	Slight (rainy).
20th	7.15 a.m.	—	2	5.41 a.m.	Slight.
21st	10.35 p.m.	—	3	6.28 p.m.	Strong.
24th	5.00 a.m.	—	6	7.53 a.m.	Light.

Date.	Time.	Direction.	Date of moon.	High tide.	Remarks.
Dec. 6th	3.40 a.m.	—	17	6.27 a.m.	—
9th	8.00 a.m.	—	20	8.54 a.m.	—

1893.

Jan. 3rd	12.30 p.m.	—	16	5.32 a.m.	Light.
8th	5.40 p.m.	—	21	9.40 p.m.	Sharp.
Feb. 17th	7.00 a.m.	—	30	5.03 a.m.	Slight.
27th	8.55 a.m.	—	10	0.07 p.m.	Slight.
March 2nd	8.53 p.m.	—	15	5.03 p.m.	Slight.
3rd	9.03 a.m.	—	16	6.05 a.m.	Slight.
18th	1.30 p.m.	—	1	5.40 a.m.	Slight.
24th	5.00 a.m.	—	7	9.27 a.m.	Slight.
April 6th	10.00 p.m.	—	20	8.56 p.m.	Slight.
19th	11.20 p.m.	—	4	7.21 p.m.	Slight.
30th	11.20 a.m.	—	15	5.09 a.m.	Long.
May 11th	5.00 a.m.	—	26	0.31 a.m.	Slight.
June 4th	5.15 a.m.	—	20	8.04 a.m.	Slight.
4th	11.10 a.m.	—	20	8.04 a.m.	Slight.
10th	8.05 a.m.	—	26	0.55 a.m.	Slight.
11th	7.10 a.m.	—	27	1.58 a.m.	Slight.
12th	4.05 a.m.	—	28	2.57 a.m.	Slight.
13th	7.45 p.m.	—	29	4.18 p.m.	Slight.
Aug. 2nd	6.20 a.m.	—	20	8.40 a.m.	Slight.
20th	12.30 p.m.	—	10	10.41 a.m.	Slight.
28th	3.30 p.m.	—	18	6.04 a.m.	Slight.
Sept 3rd	7.00 a.m.	—	24	9.41 a.m.	Sharp.
4th	5.00 a.m.	—	25	10.32 a.m.	Light.
15th	9.30 a.m.	—	6	8.11 a.m.	Light.
15th	6.25 p.m.	—	6	8.11 a.m.	Shock.
26th	6.20 p.m.	—	17	5.51 p.m.	Light.
Nov. 28th	1.16 a.m.	—	21	8.19 a.m.	Light.
Dec. 22nd	3.00 a.m.	—	15	3.53 a.m.	Light.
22nd	7.35 p.m.	—	15	3.53 a.m.	Light.
26th	5.30 a.m.	—	19	7.25 a.m.	Light.
29th	11.40 a.m.	—	22	9.55 a.m.	Light.

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1894.

Date.	Time.	Direction.	Date of moon.	High tide.	Remarks.
Jan. 4th	1.38 p.m.	—	28	3.48 p.m.	Slight.
10th	6.40 p.m.	—	4	7.41 p.m.	Slight.
18th	3.45 p.m.	—	12	1.40 p.m.	Slight.
19th	8.20 p.m.	—	13	3.01 p.m.	Slight.
21st	5.50 p.m.	—	15	5.10 p.m.	Slight.
Feb. 2nd	7.10 p.m.	—	27	3.17 p.m.	Slight.
4th	4.55 a.m.	—	29	4.46 a.m.	Slight.
14th	8.05 p.m.	—	9	10.44 a.m.	Slight.
16th	2.02 p.m.	—	11	1.11 p.m.	Slight.
20th	8.30 a.m.	—	15	5.34 a.m.	Two shocks, strong
22nd	3.00 a.m.	—	17	6.58 a.m.	Light.
24th	9.39 p.m.	—	19	8.29 p.m.	Light.
25th	4.19 a.m.	—	20	5.34 a.m.	Light.
27th	1.04 p.m.	—	22	10.15 p.m.	Light.
March 3rd	10.20 p.m.	—	27	2.39 p.m.	Light.
5th	11.02 a.m.	—	29	4.25 a.m.	Strong.
15th	3.30 a.m.	—	9	10.21 a.m.	Light, two shocks between 3 and 3.30 a.m.
22nd	7.30 p.m.	—	16	6.14 p.m.	Light.
April 1st	8.30 p.m.	—	26	1.59 p.m.	Light.
2nd	5.30 a.m.	—	27	2.41 a.m.	Light.
14th	3.32 a.m.	—	9	11.34 a.m.	Strong and long.
28th	1.30 a.m.	—	23	10.31 a.m.	Light.
29th	8.43 p.m.	—	24	11.41 a.m.	Light.
May 10th	4.15 a.m.	—	6	8.26 a.m.	Long, about 30 sec.