

The mean results are as follows, y_1 and y_2 denoting respectively the durations of the 1st and the 2nd preliminary tremors.

Distant Earthquakes (14 cases):—

$$y_1 = 8 \text{ m } 4 \text{ s,}$$

$$y_2 = 7 \text{ m } 35 \text{ s,}$$

$$\text{Ratio } \frac{y_1}{y_2} = 1.06.$$

Earthquakes of Groups II—IX (31 cases):—

$$y_1 = 25 \text{ s,}$$

$$y_2 = 23 \text{ s,}$$

$$\text{Ratio } \frac{y_1}{y_2} = 1.09.$$

Thus the durations of the two preliminary tremors are found to be nearly identical for distant earthquakes as well as for comparatively near ones; y_1 being, however, slightly greater than y_2 . These results are nearly the same as those formerly found. (See the *Publications*, No. 5.)

VIII. The Direction of the First Displacement in the Principal Portion of the Local Earthquakes.

§ 13. The following two tables give the direction of the very first displacement in the *principal portion* of the EW component earthquake motion, whose origin was not far from Tōkyō; only those cases being taken, in which the distinction between the preliminary tremor and the principal portion was well defined. Table XXII relates to the Hitōsubashi observations, while Table XXIII relates to the Hongō observations made in 1898-1899.

TABLE XXII.

INITIAL DIRECTION OF MOTION OF THE PRINCIPAL
PORTION. **Hitotsubashi.**

Group.	Eqke No.	Direction.	Group.	Eqke No.	Direction.	Group.	Eqke No.	Direction.
III	45	E	V	363	E	VIII, A	239	E
	59	W		368	E		247	E
	101	W	14	E	280		E	
	230	W	41	W	358		E	
	355	E	57	W	378		E	
IV	37	E	VIII, A	70	W	VIII, B	382	W
	60	W		71	E		55	W
	64	E		77	W		72	W
	138	W		80	E		81	W
	160	E		87	W		93	W
	270	W		99	E	140	W	
V	292	E		111	W	144	W	
	295	E		128	E	145	E	
	301	E		163	E	148	E	
	309	E		172	W	181	E	
	315	E		180	E	242	W	
	316	E	190	W	265	E		
	317	E	191	W	275	E		
	323	E	204	E	282	E		
	328	E	212	E				
	330	E	232	E				

TABLE XXIII.
INITIAL DIRECTION OF MOTION OF THE
PRINCIPAL PORTION. **Hongo.**

Group.	Eqke No.	Direction.	Group.	Eqke No.	Direction.	Group.	Eqke No.	Direction.
III	94	E	VIII, a	55	W	VIII, a	159	E
	167	E		67	E		180	E
	176	E		77	E	VIII, c	6	E
VIII, a	7	W		80	E		78	E
	10	E		114	E		101	W
	38	E		124	E		227	E
	46	W		135	E			
	49	E		157	W			

From the above two tables taken together, we obtain the following results.

Groups III and IV:—

{ Initial displacement directed toward E, 9 cases,
 { " " " " W, 6 " .

Group V:—

{ Initial displacement directed toward E, 12 cases,
 { " " " " W, 0 " .

Group VIII, A:—

{ Initial displacement directed toward E, 29 cases,
 { " " " " W, 15 " .

Group VIII, B:—

{ Initial displacement directed toward E, 4 cases,
 { " " " " W, 9 " .

Thus it will be seen that in earthquakes of Groups III, IV and VIII A, the displacement in question is, in majority of cases, directed toward E; while in earthquakes of Group V, it is *always* toward

the same direction. In earthquakes of Group VIII B, however, the direction was oftener toward W than toward E. These facts seem to indicate that the direction of the first displacement of the principal portion at a given station is generally determined by the position of the seismic origin with respect to the latter, or that those earthquakes originating from a given centre or focus are generally caused by similar subterranean disturbances.

IX. Duration of the Preliminary Tremor in the Earthquakes of Groups VIII A and VIII B.

§ 14. In the macro-seismic disturbances of near origin, or the earthquakes of Group VIII A, the duration of the total preliminary tremor varied, with a few exceptions, between 3 and 17 sec.; those most frequently occurring being from 6 to 11 sec. The frequency of the different cases was as follows.—

TABLE XXIV.

DURATION OF THE PRELIMINARY TREMOR. [EARTHQUAKES OF GROUP VIII A.]

Duration of total preliminary tremor.	Number of cases.	Duration of total preliminary tremor.	Number of cases.
sec. 3	1	sec. 13	2
4	2	14	4
5	1	15	2
6	9	16	2
7	5	17	2
8	5	18	1
9	3	19	1
10	4	22	1
11	6	29	1
12	3		