

$$2a' = 16 \text{ mm}, 2a'' = 1,2 \text{ mm},$$

$$\text{Ratio } \frac{2a'}{2a''} = 13.$$

The mean of the ratios $\frac{2a'}{2a''}$ is about 9. The distances of the centres of the above three earthquakes from Tōkyō were respectively 400, 140, and 390 km.

The probable conclusion is that, in great earthquakes, the slow period motion would be many times greater than the quick period one. Further, it is to be remembered that quick vibrations diminish much more rapidly than slow ones, as the seismic disturbances spread from the centre, owing to the viscosity of the material forming the earth's crust.

VII. Durations of the 1st and the 2nd Preliminary Tremors.

§ 12. The following table gives the durations of the 1st and 2nd preliminary tremors in the cases of 45 earthquakes observed at Hitotsubashi, in which these two introductory stages of motion were well demarked from each other.

TABLE XXI.
DURATIONS OF THE 1ST AND THE 2ND
PRELIMINARY TREMORS.

Group.	Eqke No.	1st P. T.	2nd P. T.	Group.	Eqke No.	1st P. T.	2nd P. T.
		m s	m s			m s	m s
I	2	7. 24	5. 28	III	18	0. 15	0. 18
	10	7. 25	7. 40		37	0. 11	0. 11
	13	10. 40	11. 00		160	0. 06	0. 06
	56	8. 00	7. 16		240	0. 17	0. 13
	136	14. 50	18. 40	V	318	0. 11	0. 09
	209	7. 40	7. 03		328	0. 56	0. 43
	213	0. 41	0. 41		363	0. 12	0. 13
	214	0. 18	0. 19				
	218	7. 39	4. 43				
	272	5. 55	5. 00				
	273	8. 18	6. 45	IV	59	0. 23	0. 23
	277	7. 22	5. 05		67	0. 35	0. 35
	288	9. 56	11. 00		118	0. 34	0. 26
	291	16. 55	15. 36		121	0. 45	0. 38
	<i>Mean.</i>	8. 04	7. 35	271	0. 37	0. 35	
VIII A	47	0. 07	0. 07	IX	85	0. 19	0. 19
	50	0. 06	0. 06				
	119	0. 11	0. 11	II	20	1. 00	0. 18
	163	0. 06	0. 06		28	1. 03	0. 49
	164	0. 08	0. 08		43	0. 51	0. 51
	177	0. 07	0. 07				
	180	0. 04	0. 04				
	191	0. 06	0. 06				
243	0. 12	0. 07					
VIII B	23	0. 08	0. 08	VI	126	2. 15	2. 00
	100	0. 29	0. 29				
	139	0. 12	0. 12				
	144	0. 07	0. 08				
	205	0. 05	0. 06				
				<i>Mean.</i>	0. 25	0. 23	

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.