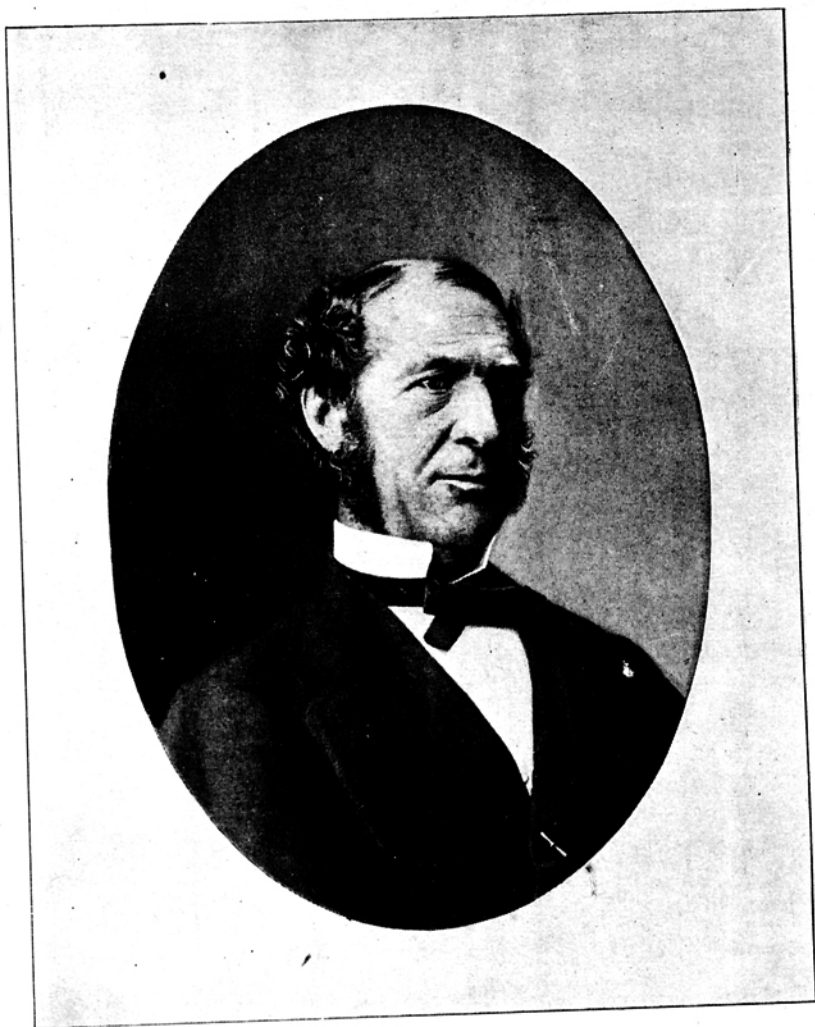


TRANS. N.Z. INST., VOL. XXXV.



WILLIAM THOMAS LOCKE TRAVERS.
See p. xviii.

†
TRANSACTIONS
AND
PROCEEDINGS
OF THE
NEW ZEALAND INSTITUTE
1902

VOL. XXXV.
(EIGHTEENTH OF NEW SERIES)

EDITED AND PUBLISHED UNDER THE AUTHORITY OF THE BOARD OF
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BY
SIR JAMES HECTOR, K.C.M.G., M.D., F.R.S.
DIRECTOR

ISSUED JULY, 1903

WELLINGTON
JOHN MACKAY, GOVERNMENT PRINTING OFFICE
KEGAN, PAUL, TRENCH, TRÜBNER, & CO., PATERNOSTER HOUSE,
CHARING CROSS ROAD, LONDON

RECORDS OF MILNE SEISMOGRAPH NO. 20, AT WELLINGTON, FROM JANUARY, 1902, TO DECEMBER, 1902
(INCLUSIVE).

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Plates LIII. and LIV.

Latitude, 41° 17' S.; longitude, 174° 47' E. Greenwich mean civil time. Midnight, 0 h. or 24 h.; hours, 1 to 24. Time in hours, minutes, and tenths of minutes.

Record numbers 1, 2, . . . from the 1st October, 1900. P.T., preliminary tremors. A.T., after-tremors. B., E., beginning and end of vibrations generally not less than 2 mm. Amp., full amplitude in millimetres.

The instrument is placed in a special room below a house standing about 30 ft. from the edge of a rocky cliff about 50 ft. high, situated about 250 yards from the shore-line of Wellington Harbour.

GEORGE HOGGEN, Observer.

No.	Date.	P.T. (from)	B.	Maxima.		Amp.	E.	A.T. (till)	Remarks.
				From	To				
	1902.					Mm.			
200	Jan. 2	5.45.5	..	..	..	..	..	6.22.0	Very small tremors.
201	" 14	..	..	2.19.8	2.30.8	1.0	..	..	Three small local shocks.
202	" 14	..	..	2.24.8	..	..	..	..	One local shock.
203	" 18	0.39.0	..	16.37.8	..	1.0	..	6.35.0	Very small tremors.
204	" 18	..	..	..	..	..	..	..	Local.
205	" 19	..	..	9.26.0	..	3.0	..	..	Three local shocks.
				3.34.0	..	4.0	..	..
				7.07.5	7.19.0	7.0	..	..
				7.16.0	..	7.0	..	..
206	" 19	..	..	10.51.0	..	2.0	..	..
				11.31.3	..	1.5	..	..
				11.34.0	..	3.5	..	..
				23.41.5	..	1.75	23.45.3	..	
207	" 24	23.36.8	..	..	..	..	..	0.09.3	
	" 25	..	..	..	..	..	..	8.58.5	
208	Feb. 9	7.41.8	7.45.8	7.46.5	..	6.0	7.52.3	+22.00.0	Very minute tremors.
209	" 16	+10.10.0	..	..	..	..	..	..	P.T., small; A.T., minute.
	" 24	+16.50.0	..	..	..	..	..	..	(Boom-period, 16.5 sec.)
210	" 25	..	..	8.35.5	..	1.5	..	+10.30.0	

Appendix.

211	{	Feb.	25	14.27-0		16.17-0	..	1.5	..	11.17-0	
		"	26	..	..	15.41-0	..	..	..	..	Small local shock.
		"	27	..	..	..	..	..	..	..	Small tremors.
212	{	Mar.	1	..	..	..	..	..	..	?
		"	1	20.20-0	..	..	..	..	..	..	A.T., very small.
213	{	"	5	19.24.8	19.48.8	19.54.5	20.03.5	3.5	20.07.8	0.30-0	
		"	6	..	..	..	..	..	..	14.18.8	Very small tremors.
214	{	"	6	8.50.5	..	..	..	..	..	..
		"	6	17.02-0	..	..	..	..	..	..	Tremors minute with intervals of rest, but increasing from 20 h. on 11th March.
215	{	"	7	..	..	20.18-0	..	2.0	..	4.25-0	
		"	11	..	..	..	..	..	..	16.42.8	* Prin. maximum at 15.21.5.
216	{	"	12	..	15.14-0	15.15-0	*15.22.8	9.6	15.31-0	..	
		"	12	..	..	..	..	..	..	7.32-0	Tremors mostly minute.
217	{	"	13	18.27.8	..	..	..	..	..	22.46.5	Minute tremors.
		"	14	..	..	..	..	..	..	..	Tremors, small for eight hours, with three other maxima not quite so large between, and several smaller afterwards; then tremors till *; then tremors dying away.
218	{	"	14	20.57.5	19.22-0	19.24.8	..	2.75	..	..
		"	15	8.08.5	..	..	0.06.5	2.25	..	..
219	{	"	16	..	..	..	*2.10.5	2.5	..	..
		"	17	..	..	..	..	..	..	+7.00-0	Very minute tremors.
220	{	"	18	..	..	..	..	..	..	22.20-0	
		"	18	16.36-0	..	..	..	..	..	..
221	{	"	18	20.31-0	..	23.34-0	..	1.0	..	7.05.8	
		"	19	..	..	..	..	..	..	15.32-0	(Boom-period, 15 sec.)
222	{	"	20	..	15.27.8	15.28.5	..	1.0	..	..	Very minute tremors for about six hours.
		"	20	..	..	..	..	..	..	?
223	{	"	20	20.44-0	..	..	..	..	..	..	Minute tremors.
		"	20	+17.40-0	..	..	..	..	..	+7.30-0	
224	{	"	21	..	..	..	..	..	..	..
		"	22	..	..	..	..	..	..	..	(Boom-period, 18 sec.) Tremors minute.
225	{	"	22	22.55-0	..	..	..	..	..	10.00.5	
		"	22	..	..	..	..	..	..	..	Local.
226	{	"	23	..	1.33-0	1.39-0	..	1.25	1.51.8	..	
		"	23	..	..	22.19-0	..	1.0	..	..	Very minute tremors.
227	{	"	24	..	..	..	..	..	..	..
		"	24	19.49-0	..	..	..	..	..	10.18.5	
228	{	"	25	
		"	26	Occasional minute tremors.
229	{	"	26	+20.30-0	+8.30-0	
		"	27	

Seismograph Records.

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[NOTE.—During January I was away from home, and the instrument was not kept sensitive enough, the boom-period being only about 12 sec. to 14 sec.—G. H.]

+ About.

RECORDS OF MILNE SEISMOGRAPH No. 20—continued.

No.	Date.	P.T. (from)	B.	Maxima.		Amp.	E.	A.T. (till)	Remarks.
				From	To				
	1902.					Mm.			
230	Mar.	28 ..	5.48·8	5.51·0	..	2·0	5.54·5	..	} A few minute tremors between.
		28 9.48·8	10.02·0	10.08·0	10.07·0	1·5	10.12·5	..	
231	"	28 ..	..	10.16·0	..	3·0	..	..	Local.
232	" 28	14.54·0	15.03·8	15.19·0	15.32·8	8·0	15.43·0	?	Decided motion began at 15.3·8, but still more marked at 15.17·5.
			or 15.17·5						
233	" 28	16.55·5	17.01·8	17.11·8	17.16·8	3·5	17.32·8	?	} Probably "repeats" of No. 232.
234	" 28	?	18.08·0	18.11·8	18.18·0	2·0	18.18·5	?	
235	" 28	?	20.13·8	20.24·8	20.31·0	1·0	20.37·8	?	} Probably local.
236	" 28	?	22.26·8	22.31·0	22.37·8	1·0	22.42·5	?	
237	" 29	?	..	6.56·5	..	1·5	..	..	Minute tremors.
238	" 30	†1.00·0	..	..	..	..	..	†4.15·0	} Followed by minute tremors for about eight hours and a half.
239	" 30	19.03·0	..	19.16·0	..	1·0	..	?	
240	" 31	15.56·8	16.01·0	16.04·8	16.10·0	2·0	16.11·5	16.13·8	} Very minute tremors.
241	April	31 21.18·0	..	..	..	..	..	10.45·5	
		1 ..	..	..	..	..	..	..	..
242	" 1	†18.00·0	..	..	..	..	..	†1.50·0	Minute tremors.
243	" 2	19.37·0	..	..	..	..	..	..	} Minute and small tremors, with a few very small shocks; ? Cheviot.
244	" 3	..	..	..	..	..	..	7.46·0	
245	" 5	..	..	18.10·8	..	4·5	..	..	(Boom-period, 17·5 sec.
246	" 6	..	11.13·8	11.15·8	..	7·0	11.22·5	?	Local; tremors minute between and after second shock.
247	" 6	..	21.59·0	22.00·5	..	1·2	22.02·5	..	(Boom-period, 18 sec.)
248	" 7	..	2.34·5	2.35·5	..	0·8	2.37·8	..	} Very minute tremors between.
249	" 7	..	5.40·0	5.49·8	..	1·5	5.50·0	..	
250	" 7	..	8.08·0	8.06·8	..	0·8	8.08·8	..	} Tremors minute and very small, with very small shocks.
250	" 8	20.33·5	..	..	..	..	..	14.08·5	

251	April	10	..	14.50·5	14.51·0	..	?	14.52·8	..	Very small.
252	"	10	..	20.21·0	..	..	?	20.24·8	..	
253	"	10	23.34·0	..	..	..	..	..	8.00·0	Tremors minute, increasing for seventeen hours; then small for thirty hours; then minute.
		18	..	..	..	..	..	..	..
254	"	18	20.43·5	..	..	..	..	..	..	Very small, three hours; minute, thirteen hours; then small for four hours.
		14	..	15.29·8	..	..	?	..	22.40·5	
255	"	15	23.58·8	..	..	..	..	..	8.38·0	Minute tremors, with small shocks.
		16	..	1.44·0	..	..	0·8	..	..
256	"	16	23.26·5	..	..	..	..	..	9.48·5	Several small and minute tremors.
		17	..	..	..	..	..	..	..
257	"	17	20.44·0	..	..	..	..	..	2.38·0	
		18	..	..	..	..	..	..	..
258	"	19	2.38·0	2.47·5	2.49·5	..	..	..	5.09·8	Guatemala EQ.
		3.18·5	3.39·5	40+	?	19.33·0	..		Small tremor.
259	"	20	..	19.18·5	..	..	..	20.53·0	..	
260	"	20	..	20.44·0	20.48·8	..	2·5	21.51·0	..	
261	"	20	..	21.44·5	..	..	?	..	16.00·0	Tremors.
262	"	22	10.24·0	..	..	..	..	..	8.07·0	Minute tremors.
263	"	23	5.23·0	..	..	..	..	..	..	Several minute tremors and small shocks.
264	"	23	18.58·0	..	..	..	..	..	5.41·0	
		24	..	..	..	..	..	..	..	..
265	"	24	20.42·0	..	..	..	..	..	22.29·0	Very small tremors.
		25	..	..	..	..	..	..	..
266	"	25	16.00·0	..	..	..	..	7.40·0	Minute tremors.	
267	"	25	19.27·0	..	..	..	..	?	Very minute tremors.	
268	May	30	8.59·0	..	..	..	..	..	8.15·0	Many small tremors and shocks.
		2	..	..	..	..	..	..	..
269	"	3	22.44·0	..	..	..	..	..	9.56·0	Minute tremors. (Boom-period, 18 sec.)
		4	..	..	..	..	..	..	22.45·0	
270	"	4	21.58·0	..	..	..	..	..	..	Minute tremors.
		5	21.04·0	..	..	..	..	..	..
271	"	6	..	..	..	..	..	..	14.44·0	"
		6	..	..	..	..	..	..	..
272	"	7	..	..	10.18·8	..	..	5·0	?	Local.
273	"	7	..	..	15.31·8	..	..	..	..	Tilt 1·5 mm. west.
274	"	7	..	..	..	..	..	..	10.38·5	P.T. and A.T. minute. Caribbean Sea.
		7	21.37·0	..	..	..	v. sm.	..	..
275	"	8	2.54·8	..	2.14·0	3.09·8	1·5	3.11·0	..	? Martinique.
		8	13.25·8	..	13.26·0	..	1·75	13.31·8	..	

† About.

RECORDS OF MILNE SEISMOGRAPH No. 20—*continued.*

No.	Date.	P.T. (from)	B.	Maxima.		Amp.	E.	A.T. (till)	Remarks.
				From	To				
						Mm.			
276	May	8	19.30-8	..	..	..	..	..	Minute tremors. ? Martinique.
		9	..	..	..	..	..	9.41-3	
277	"	9	20.02-0	..	..	..	..	..	Tremors minute.
		10	..	..	9.29-8	..	1-0	..	
278	"	10	21.59-0	..	..	..	..	..	Five small shocks between * * (all about 0.5 mm.). ? Local or from Martinique.
		11	..	..	19.26-8	*19.28-3	1-0	..	
279	"	12	..	..	..	..	..	..	Other small maxima at 15.33-5 and 20.39-0 ; not local, but apparently not very distant.
		12	..	..	*3.51-5	..	2-0	15.23-5	
280	"	12	10.55-3	..	13.40-8	14.46-0	2-0	14.50-5	Tremors minute.
		13	..	..	..	..	..	1.24-8	
281	"	13	5.51-0	..	..	..	..	13.02-0	Minute tremors.
		13	13.02-0	16.09-0	16.29-0	..	3-0	..	
281	"	to	..	..	16.53-5	..	..	..	A.T. mostly minute.
		..	..	..	16.56-0	..	3-0	..	
282	"	15	..	..	18.09-0	..	..	18.22-0	Tremors small and minute.
		16	14.49-0	..	..	..	..	..
283	"	17	..	..	..	..	..	19.44-0	Minute tremors.
		17	20.04-0	..	..	..	..	..
284	"	18	..	..	..	..	..	0.02-0	Very minute tremors.
		18	8.16-0	..	..	..	..	..
285	"	18	17.20-0	..	..	..	..	6.13-0	Minute tremors.
		19	..	..	..	..	..	10.21-0	
286	"	19	18.26-0	..	..	..	..	2.35-0	Minute tremors.
		19	19.50-0	..	..	..	..	16.56-0	
287	"	20	..	..	..	..	..	22.45-0	Small tremors followed by minute tremors. * Local shock perhaps not connected with tremors,
		21	23.28-0	..	..	..	..	..
288	"	22	..	..	*10.05-5	..	..	17.17-0	

291	"	24	15.30-0	..	23.35-0	..	1-6	..	..	†10.00-0	* Tremors small and minute. * Local shock.
	"	25	..	..	..	..	..	..	..	..	Tremors mostly minute; several very small local shocks.
292	"	26	†11.00-0	..	..	..	..	..	..	†8.00-0	Minute tremors.
	"	27	..	..	..	..	..	..	..	..
298	"	27	15.37-0	..	..	..	..	..	..	2.41-0	
	"	28	..	..	..	..	..	..	..	†14.15-0	
294	"	28	†11.50-0	..	..	..	..	..	..	?	Very minute tremors for about twelve hours.
295	"	30	7.23-0	..	..	..	..	..	..	7.47-0	Very small tremors.
296	"	31	6.24-0	..	..	..	..	..	..	..	Very small local shock.
297	"	31	..	..	9.51-0	..	?	..	..	..	P.T. very small for twelve hours; then small for ten hours; large for three hours; then dying away.
298	{	31	†13.15-0	..	..	..	..	..	..	..	Local.
	June	1	..	..	22.01-0	..	3-2	..	..	?	Small tremors.
299	"	2	..	..	8.46-0	..	2-0	..	..	1.14-0	Minute tremors for about six hours and a quarter.
300	"	3	0.49-0	..	..	..	..	..	..	?	Very small local shock.
301	"	4	1.00-0	..	..	..	..	..	..	..	Very small tremor.
302	"	4	..	..	21.38-0	..	?	..	..	..	(Boom-period, 16 sec.) P.T. and A.T. minute.
303	"	5	20.46-0	..	..	..	..	..	..	20.56-0	(Boom-period, 17 sec.) P.T. minute for about four hours; then small, with some very small shocks (? local). A.T. very minute.
304	{	11	21.20-0	..	..	..	..	..	..	..
	"	12	..	0.09-0	?	..	1-0	0.15-0	..	6.07-0	
	"	12	12.33-0	..	..	..	..	..	..	..
305	{	15	..	12.26-5	12.31-0	..	5-2	12.32-3	..	..
	"	16	..	..	..	..	..	..	..	†4.15-0	
	"	19	20.43-0	..	..	..	..	..	..	..
306	{	20	..	23.21-0	23.25-5	..	3-0	23.32-0	..	..	P.T. and A.T. small to moderate.
	"	21	..	..	..	..	..	..	..	11.56-0	
307	{	21	†21.40-0	..	..	..	..	..	..	..	Minute and small tremors.
	"	22	..	..	..	..	..	..	..	†23.55-0	
308	"	23	20.47-0	..	..	..	..	..	..	22.44-0	Very minute tremors.
309	"	24	..	..	2.01-0	..	?	..	..	..	Very small local shock.
310	"	25	..	..	22.17-0	..	?	..	..	..	"

[NOTE.—Record defective from 5th June to 9th June.]
†About.

Seismograph Records.

827	July	14	12.07-0	..	19.08-5	..	1-0	} [EQQ. Italy, Turkey, Venezuela.]
	"	15	..	..	..	..	..	..	1.20-0
828	Aug.	9	14.37-3	14.43-6	14.47-2	..	5-2	15.05-0	*16.00-0	} Other tremors for two hours before. (Boom-period, 18 sec.)
	"	13	19.12-0	..	..	..	..	..	8.15-0
829	"	14	9.03-6	} Small tremors, with several small shocks.
830	"	16	8.11-6	8.19-5	8.22-5	..	9-0	8.28-3	..		} [Tidal wave at Altata and other Mexican harbours.] (Boom-period, 17 sec.)
	"	20	*22.00-0	..	..	..	..	..	2.40-0
831	"	22	} Small tremors. [Philippines.]
	"	22	3.29-0	4.06-5	4.23-9	4.27-5	8-0	..	..
832	"	23	22.30-0	} After-tremors large. [Kashgar.]
	"	24	..	..	..	..	..	..	92.5-0
833	Sept.	5	12.39-8	9.03-0	} Smaller tremors. } Tremors, many large.
	"	7	..	..	..	..	..	..	..
834	"	9	22.57-0	} Small shocks; probably local.
835	"	10	..	..	1.16-6	..	..	..	..
836	"	10	8.02-6	} Small tremors.
837	"	10	16.40-0	..	..	..	..	..	*6.50-0
	"	12	..	..	..	..	..	..	..
838	"	14	14.41-0	11.51-0	} Tremors; very small to small.
	"	15	..	..	..	..	..	..	2.27-5
839	"	16	2.01-5	..	2.03-4	..	2-0	..	10.21-0	} [? Australia.]
840	"	17	7.40-0	..	..	..	..	..	..
841	"	18	22.44-3	..	23.10-3	..	3-0	} Very small tremors. [? Australia.]
842	"	19	..	..	9.18-2	..	..	..	..
843	"	19	9.28-1	} Other tremors and shocks before and after for many hours. (Boom-period, 15 sec.) [EQQ. in South Australia and San Francisco.]
844	"	19	..	..	9.30-9	..	..	..	..
845	"	19	..	..	9.40-8	..	..	..	..
846	"	19	..	..	9.46-8	..	..	..	..
847	"	19	..	..	10.08-1	..	..	..	..
848	"	19	..	..	10.34-0	..	..	..	..
849	"	19	..	..	11.09-4	..	..	..	..
850	"	19	..	..	12.08-5	..	..	..	..

* About.

† Large tremors.

RECORDS OF MILNE SEISMOGRAPH No. 20—continued.

590

No.	Date.	P.T. (from)	B.	Maxima.		Amp.	E.	A.T. (till)	Remarks.
				From	To				
	1902.					Mm.			
351	Sept. 21	0.50·4	1.07·0	1.08·0	..	1·4	1.14·5	*21.30·0	Preceded and followed by tremors and other small shocks till 21.30 (about). (Boom-period, 15 sec.) [Ecuador.]
352	" 22	1.42·0	2.06·2	2.08·2	2.55·8	20·0	2.56·4	6.02·0	
353	" 23	20.33·1	{ 20.44·9 or 21.05·2	21.14·0	..	30·0	21.48·0	24.13·0	[EQ. in Central America and Mexico.]
354	" 24	1.44·0		..	1.16·8	..	1·0	1.19·0	..
355	" 25	0.35·0	*18.30·0	Small tremors. (Boom-period, 18 sec.) Small; probably local.
356	" 28	15.12·5	15.15·8	15.19·0	..	2·0	15.25·0	..	
357	" 28	20.42·4	..	20.43·0	..	..	..	..
358	" 29	..	..	7.49·0	..	..	..	..
359	" 29	19.01·0	..	21.54·2	..	2·8	" " " After-tremors very large for thirty-six hours.
	Oct. 1	..	..	..	..	..	..	7.02·0
360	" 2	*14.35·0	..	..	..	..	..	..
	" 4	Tremors, large from about 6.30 on 3rd October. (Boom-period, 17·9 sec.)
	" 4	..	..	18.16·0	..	..	..	*9.21·0
361	" 5	Local shocks and tremors.
362	" 5	14.52·2	14.57·0	14.59·2	..	3·0	10.13·0	..	
363	" 7	*3.00·0	..	..	..	..	15.14·0	..
	" 8	Tremors, many large. [EQ. in Australia.]
364	" 8	18.23·0	..	..	..	..	..	*10.00·0
	" 9	..	..	..	..	..	..	10.53·0
365	" 10	11.17·2	11.19·0	11.21·2	..	2·4	11.32·0	?	

Appendix.

366	Oct.	10	14.50-0	..	..	..	..	..	..	*16.20-0	Tremors, many large.
	"	11	..	..	..	..	..	..	..	..	Tremors, many large. [EQQ. at Perugia, &c.]
367	"	22	*20.00-0	..	..	..	..	..	..	*12.00-0	Tremors, many large. [Severe EQQ. in Guatemala; volcanic eruption at Sa. Maria.]
	"	23	..	..	..	..	3-0	..	..	..
368	"	23	*19.30-0	..	..	..	..	..	..	18.20-0	
	"	24	..	..	..	..	..	..	..	..
369	"	28	..	9.47-0	9.56-0	..	1-8	10.09-0	..	..	Small.
370	"	29	..	..	20.27-0	..	..	..	..	..	Small, but distinct. [Volcanic activity, Sandwich Islands.]
371	"	31	22.18-0	..	22.41-0	..	..	..	..	..
372	Nov.	1	*18.00-0	..	..	..	..	..	..	*22.00-0	Tremors, mostly small.
	"	2	..	..	..	..	..	..	..	..
	"	4	*18.30-0	..	..	..	..	..	..	..	[EQQ. in Bosnia.]
373	"	6	..	..	..	..	..	..	..	*8.10-0	
374	"	7	1.33-5	1.34-2	1.35-0	..	2-0	1.42-0	..	..	Followed by tremors, 10.30. [Volcanic eruption, Sandwich Islands.]
375	"	7	*19.00-0	..	..	..	..	..	..	*5.30-0	Tremors, mostly small.
	"	8	..	..	..	..	..	..	..	..
	"	8	*14.00-0	..	..	..	..	..	..	*12.00-0	
376	"	9	..	..	..	..	..	..	..	..
	"	9	*14.00-0	..	..	..	..	..	..	*7.00-0	
377	"	10	..	..	..	..	..	..	..	?	Tremors.
	"	11	1.05-0	..	..	..	..	..	..	..
378	"	11	3.31-0	3.52-0	3.53-0	..	3-0	..	..	*7.10-0	Shock, with long after-tremors.
	"	12	..	..	..	..	..	..	..	12.00-0	Tremors, many very large.
379	"	12-15	23.11-0	..	..	..	4-0	..	..	..
	"	20	20.06-5 or 20.17-5 or 20.37-0	20.41-0	20.44-2	..	20-0	?	..	..	Shock; followed by tremors and repeats till 9.45 on 21st November. ? Algeria.
380	"	21	..	..	..	..	..	..	..	*9.45-0	
	"	25	*19.40-0	..	..	..	..	..	..	*21.00-0	Tremors.
381	"	26	..	..	..	..	..	..	..	..

* About.

RECORDS OF MILNE SEISMOGRAPH No. 20—continued.

592

No.	Date.	P.T. (from)	B.	Maxima.		Amp.	E.	A.T. (till)	Remarks.
				From	To				
382	1902.					Mm.			Tremors. (Boom - period, 18.6 secs.) [Volcanic eruption in St. Vincent.]
	Nov. 27	17.42.0	..	21.19.8	..	3.2	..	5.05.0	
383	to 29	..	..	..	..	..	..	..	Tremors, many large.
	Nov. 29 to	*22.30.0	..	..	..	2.8	..	9.13.0	
384	Dec. 1	..	..	..	..	4.6	..	..	[EQ. in Denmark.]
	Dec. 12	23.55.0	..	23.59.5	..	..	0.38.2	7.46.5	
385	" 13	..	..	..	..	..	..	16.13.0	Small tremors.
	" 14	4.32.0	..	..	..	..	..	..
386	" 14	20.39.0	..	..	..	..	..	7.30.0	Tremors, moderate.
	" 15	..	..	..	..	..	..	..
387	" 16	12.52.2	..	..	..	..	..	1.51.4	Tremors, small. [Destructive EQ. in Turkestan.]
	" 17	..	..	..	..	..	..	..
388	" 17	..	..	22.14.0	..	..	..	..	Local, small.
	" 27	..	..	..	..	..	..	..
389	" 27	20.48.0	..	..	..	..	..	12.04.0	Tremors, moderate.
	" 28	..	..	..	..	..	..	..
390	" 28	19.08.0	..	..	..	..	..	7.36.0	Tremors, many large ; many shocks (?local).
	" 29	..	..	..	..	..	..	..
391	" 29	23.38.5	..	..	..	..	..	1.02.8	Small tremors.
	" 30	..	..	..	..	..	..	..

*About.
N.B.—"Local" applied to shocks in this list implies that the origin was in or near New Zealand. 1 millimeter of amplitude = 0.51 seconds of arc or angle of tilting of the east and west line.

Appendix.

RECORDS OF MILNE SEISMOGRAPH NO. 16, AT CHRISTCHURCH, NEW ZEALAND.

Latitude, 43° 31' 50" S.; longitude, 172° 37' 18" E. Time employed: Greenwich mean civil time.

P.T., preliminary tremors less than 2 mm. complete amplitude; A.T., after-tremors less than 2 mm. complete amplitude;

B., E., beginning and end of vibrations not less than 2 mm.; Amp., half-range in millimetres; 1 mm. boom motion = 0".43.

B. and E. signify beginning and end of amplitudes exceeding 1 mm., the range being 2 mm.

C. COLERIDGE FARR, Observer.

38-17

Date.	P.T. (from)	B.	Maxima.		Amp.	E.	A.T. (till)	B.P.	Remarks.
			From	To					
1902.					Mm.			Secs.	
Jan. 1	05.44.5	06.09.7	06.16.0	..	5.1	06.23.0	08.40.0	20	
" 2	..	..	15.04.5	15.07.3	1.0	..	..	..	Very sharp tremor.
" 8	23.59.7	..	00.07.7	..	1.1	..	06.47.0	18	Magnetographs much affected from 11 h. 00 m. to 11 h. 39 m.
" 12	22.39.5	23.05.47	23.08.0	..	2.6	23.10.0	00.07.0	18	
" 15	06.30.2	..	06.36.5	..	0.4	..	06.42.0	18	
" 17	06.18.5	..	06.46.8	..	0.4	..	07.18.0	18	
" 18	23.49.3	..	00.09.7	00.28.3	0.3	..	12.39.0	18	
" 21	10.13.0	..	10.22.3	..	0.6	..	10.35.5	18	
" 21	22.32.3	..	22.41.5	..	0.4	..	23.02.0	18	
" 22	06.17.0	..	06.23.0	..	0.3	..	06.28.2	18	
" 24	..	..	10.06.5	..	0.5	..	..	18	Very sharp tremor.
" 24	23.34.7	23.39.7	23.48.6	..	16.7	..	..	18	The largest "shock" recorded to this date, but not felt personally.
			23.49.5	23.51.5	17.0+				
				23.55.6	7.5				
				23.57.8	5.2	23.49.1	27.30.0		
" 26	04.30.7	..	04.36.6	..	0.7	..	04.43.0		
" 26	05.34.0	..	05.36.0	05.41.0	0.3	..	05.44.0	18	
" 28	07.26.0	..	07.28.0	..	0.3	..	..	18	

Seismograph Records.

593

RECORDS OF MILNE SEISMOGRAPH No. 16—*continued.*

594

Date.	P.T. (from)	B.	Maxima.		Amp.	E.	A.T. (till)	R.P.	Remarks.
			From	To					
1902.					Mm.			Secs.	
Jan.	30	14.23.2	14.50.8	15.01.5	15.08.0	2.0	15.08.2	16.00.0	18
Feb.	3	23.34.8	23.48.7	23.50.6	..	3.2	..	..	18
				23.53.4	..	1.8			
				23.55.4	..	1.9			
				23.56.5	..	1.8	00.01.7	00.03.0	
	9	07.40.8	07.45.9	07.49.9	07.52.0	17.0	08.30.5	Indef.	18
	9	Indef.	10.15.9	10.20.0	10.22.3	17.0	11.12.9	11.21.0	18
	10	08.25.9	08.29.8	08.30.3	..	1.2	08.31.6	08.43.2	18
	10	22.21.8	..	22.23.0	..	0.2	..	22.26.8	18
	11	00.56.3	..	01.10.6	..	0.5	..	01.19.9	18
	11	02.10.0	..	02.12.8	..	0.9	..	02.28.0	18
	13	10.59.7	..	11.09.7	..	0.3	..	10.55.9	18
	17	00.54.8	01.24.4	01.31.5	..	1.1	01.35.2	03.11.0	18
	24	01.38.0	..	01.39.7	..	0.1	..	01.54.5	18
	26	13.34.6	..	13.39.2	..	0.3	..	13.45.3	18
Mar.	1	00.34.6	..	01.05.2	..	0.2	..	01.30.0	18
	3	10.51.7	..	11.00.4	..	0.8	..	Indef.	18
	5	19.31.2	19.47.6	19.51.6	..	2.9	19.57.2	20.38.4	18
	10	04.37.8	..	04.53.8	..	0.2	..	05.38.6	18
	12	15.15.0	15.15.5	15.20.2	..	4.7	..	..	18
				15.24.2	..	4.5			
				15.26.2	..	4.0	15.35.4	15.59.7	
	22	23.14.0	..	23.31.8	..	0.8	..	..	17
	23	01.34.3	..	01.39.8	..	0.5	..	01.56.3	17
	25	04.25.7	..	04.28.3	..	0.1	..	04.48.5	17

Isolated tremor.

Slight tremor; storm afterwards.

Appendix.

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Mar.	28	05.46-8	..	05.47-4	05.49-8	0-6	..	06.06-2	17
"	28	09.42-0	..	10.08-5	..	1-0	..	10.87-2	17
"	28	14.58-8	15.08-4	15.28-8	..	4-2
				15.24-7	..	4-0	..	..	..
				15.29-2	..	3-1	15.98-7	18.11-0	17
"	31	..	..	16.08-5	..	0-8	..	Indef.	17
April	1	..	..	09.11-0	..	0-2	..	"	..
				09.12-7	..	0-2	..	..	..
"	6	06.58-2	..	06.58-0	..	0-3	..	07.05-0	..
"	7	02.31-0	..	02.34-2	..	0-3	..	02.54-0	16
"	7	05.39-0	..	05.52-2	..	1-0	..	06.48-7	16
"	7	08.02-2	..	08.07-5	..	0-2	..	Indef.	16
"	9	Indef.	..	08.08-7	..	0-9	..	"	16
"	10	14.48-7	..	14.51-0	..	0-2	..	..	..
"	18	04.58-0	..	04.59-0	..	0-1	..	05.10-0	16
"	14	22.24-7	..	22.37-5	..	0-1	..	22.48-0	..
"	14	23.38-5	..	23.38-2	..	0-2	..	23.46-0	16
"	17	17.22-0	..	17.24-0	..	0-1	..	17.80-0	16
"	19	02.37-2	02.48-0	03.15-2	..	8-6	..	..	..
				03.19-2	..	12-0	04.21-0	05.56-0	..
"	20	21.42-0	21.44-0	21.45-0	..	1-3	..	..	16
				21.47-0	..	1-4	21.47-5	22.30-0	16
"	21	15.10-0	..	15.31-0	..	0-2	..	15.46-5	16
"	21	Indef.	..	18.02-0	..	1-0	..	Indef.	16
"	22	10.48-0	..	10.50-5	..	0-1	..	..	16
				10.55-2	..	0-1	..	11.02-5	16
"	25	11.44-0	..	12.05-0	..	0-1	..	12.16-7	16
"	27	..	..	04.52-7	..	0-4	..	..	16
"	27	..	..	05.30-0	..	0-1	..	05.33-0	16
"	28	..	..	18.15-2	..	0-4	..	..	16
May	2	11.55-0	..	12.17-7	..	0-2	..	13.01-0	16-7
				12.31-0	..	0-1	..	..	16-7
"	5	06.00-0	..	06.02-2	..	0-4	..	06.12-5	16-7
"	7	03.43-0	..	03.49-2	..	0-1	..	03.53-0	16-7
"	7	..	..	06.16-0	..	0-1	..	..	16-7

Origin Guatemala.

Sudden tremor.

Tremor, storm in progress.

Seismograph Records.

595

RECORDS OF MILNE SEISMOGRAPH No. 16—continued.

596

Date.	P.T. (from)	B.	Maxima.		Amp.	E.	A.T. (till)	B.P.	Remarks.
			From	To					
1902.					Mm.			Secs.	
May 8	02.55.0	..	03.12.0	..	0.2	..	03.40.0	16.7	
" 8	13.27.0	..	13.27.7	..	0.6	..	13.31.0		
" 21	12.53.5	..	12.54.0	..	0.1	..			
"			12.56.2	..	0.1	..	13.02.2	16.7	
" 25	00.09.5	..	00.14.0	..	0.1	..	00.16.5		
" 31	05.08.7	..	05.20.0	..	0.2	..	05.27.2	16.7	
" 31	07.09.7	..	07.12.2	..	0.5	..			
			07.18.2	..	0.6	..	07.41.9	16.7	
June 7	20.40.5	..	21.32.0	..	0.2	..	22.13.0	16	
"			21.48.2	..	0.2	..			
" 10	03.37.2	..	03.46.0	..	0.3	..	03.58.2	16	
" 18	00.17.2	..	00.28.2	..	0.2	..	00.52.9	16	
" 19	05.06.7	05.09.5	05.10.0	..	1.6	..	05.33.2	16	
" 19	12.28.0	12.30.7	12.31.0	..	1.9	..	13.03.7	16	
" 21	06.51.5	..	06.59.0	..	0.7	..	..	16	
" 22	02.02.2	..	02.03.2	..	0.5	..	02.20.2	16	
" 26	05.23.5	..	05.51.2	..	0.6	..	06.31.0	16	
July 6	07.28.0	..	07.32.0	..	0.3	..	07.37.0	16	Elongated swelling.
" 6	08.49.0	..	08.55.0	..	0.2	..	09.12.0	16.6	"
" 6	13.07.8	13.15.0	13.18.0	..	7.0	..			
			13.33.0	..	3.0	..			
			13.36.5	..	3.2	..	..	16.6	A.T. obscured by N.T.
" 7	02.39.5	..	02.45.6	..	0.5	..	03.30 ±		
Aug. 2	22.51.8	..	3.0		Origin Suva? Beginning and end obscured by N.T.
			22.56.0	..	2.5	..			

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Aug.	8	20.12·0	Swelling.
"	9	14.44·3	..	2·1	Sudden. P.T. and A.T. obscured.
				14.46·4	..	2·1	
"	13	04.54·6	0·8	..	05.04·2	..	Elongated swelling.
"	16	08.11·8	08.24·0	08.25·6	..	8·0	08.36·3	..	..
				08.27·1	..	7·2	..	10.08·8	..	
"	22	03.20·8	03.41·2	04.20·3	..	3·5	..	..	..
				04.21·9	..	4·0	..	07.14·8	16·6	Kashgar.
				..	04.34·6	..	..	..	..
Sept.	10	02.07·9	..	..	..	..	..	12.11·9	..	Cheviot.
"	11	03.00·6	..	..	..	..	..	03.20·4	..	Elongated swelling.
"	22	01.57·3	02.02·0	02.06·4	02.33·7	14·3	02.52·3	06.00·3	16·6	
"	23	?	20.44·7	21.07·6	21.28·3	18·0	21.51·6	25.03·4	16·6	
"	24	05.31·5	..	..	..	0·5	..	05.56·9	..	} Look like repetitions; similar elongated swellings.
"	24	08.25·2	..	..	..	0·8	..	08.50·7	..	
"	24	10.50·7	..	..	..	0·2	..	11.02·7	..	
Oct.	12	08.33·6	..	..	..	0·4	..	08.53·0	..	Elongated swelling.
"	28	09.54·2	..	10.16·0	..	1·1	..	?	..	
Nov.	13	10.31·6	..	10.32·5	..	0·2	..	?	..	
"	20	20.31·8	20.35·5	10.42·0	..	6·5	20.49·3	22.33·7	..	
"	21	07.23·6	..	..	..	..	..	08.49·3	..	
Dec.	25*	05.32·7	05.36·8	05.39·3	..	1·7	05.41·9	06.33·0	..	Prolonged, but slight.

* Not in operation from 1st to 25th.

Seismograph Records.