

EARTHQUAKES ON THE PHILIPPINES IN THE YEAR 1876, ACCORDING TO THE PUBLICATION OF THE "ATENE0 MUNICIPAL" IN MANILA. COMMUNICATED BY DR. A. B. MEYER, DRESDEN.

Date.	Hour.	Place.	Province or District.	Island.	Direction.	Remarks.
January 19	1 A.M.	Vigan . . . .	Ilocos sur. . . . .	Luzon .	—	—
February 7	4-5 A.M.	Iba . . . . .	Zambales . . . . .	" .	—	—
" 10	7 A.M.	Laoag . . . . .	Ilocos norte . . . . .	" .	—	—
March 18	12.15 A.M.	Vigan . . . . .	Ilocos sur. . . . .	" .	—	—
" 18	11-12 P.M.	Benguet . . . . .	Benguet . . . . .	" .	—	—
" 21	5-6 A.M.	Batangas . . . . .	Batangas . . . . .	" .	—	—
" 31	2.25 P.M.	Laoag . . . . .	Ilocos norte . . . . .	" .	N.-S.	—
April 14	2-3 A.M.	Iba . . . . .	Zambales . . . . .	" .	—	—
June 12	12.45 A.M.	Nueva-Caceres . . . . .	Camarines, S. . . . .	" .	—	—
" 12	11-12 P.M.	Albay . . . . .	Albay . . . . .	" .	—	—
" 18	? A.M.	Laoag . . . . .	Ilocos norte . . . . .	" .	N.-S.	—
July 13	10.30 P.M.	Iba . . . . .	Zambales . . . . .	" .	—	—
" 13	"	Cavite . . . . .	Cavite . . . . .	" .	N.-S.	—
" 13	10-11 P.M.	Bulacan . . . . .	Bulacan . . . . .	" .	—	—
" 13	10.34 P.M.	Manila . . . . .	Manila . . . . .	" .	N.N.E.-S.S.W.	Intensity 3°, sismometer 2 mm. Strong.
" 26	? A.M.	Tacloban . . . . .	—	Leyte .	—	—
" 26	4 A.M.	Surigao . . . . .	—	Mindanao	E.-W.	—
" 27	10 A.M.	Baler . . . . .	Com. P. M. d. Principe	Luzon .	N.-S.	—
August 10	5.45 A.M.	Nueva-Caceres . . . . .	Camarines, S. . . . .	" .	W.-E.	—
" 21	12-1 A.M.	Iba . . . . .	Zambales . . . . .	" .	—	—
" 22	10-11 P.M.	" . . . . .	" . . . . .	" .	—	—
" 23	12.30 A.M.	Vigan . . . . .	Ilocos, S. . . . .	" .	—	—
September 13	10 A.M.	Nueva-Caceres . . . . .	Camarines, S. . . . .	" .	—	—
" 15	11.30 P.M.	Surigao . . . . .	—	Mindanao	W.-E.	—
November 15	7-8 A.M.	Iba . . . . .	Zambales . . . . .	Luzon .	—	—
" 17	11.30 P.M.	Vigan . . . . .	Ilocos, S. . . . .	" .	—	—
" 17	night.	Benguet . . . . .	Benguet . . . . .	" .	—	—
" 17	"	Cayan . . . . .	Lepanto . . . . .	" .	—	—
" 18	4-5 A.M.	Iba . . . . .	Zambales . . . . .	" .	—	—
" 19	8 P.M.	Mobo . . . . .	—	Masbate .	—	—
" 22	noon.	" . . . . .	—	" .	—	—
" 26	—	Albay . . . . .	Albay . . . . .	Luzon .	—	Great eruption of Mount Tacbacon.
" 27	11.5 P.M.	Manila . . . . .	Manila . . . . .	" .	—	One shock, intensity 3 mm.
December 12	4.5 P.M.	" . . . . .	" . . . . .	" .	N.E.-S.W.	Intensity 1°, sismometer 1 mm.
" 12	9.45 P.M.	Zamboanga . . . . .	—	Mindanao	—	—
" 13	4 P.M.	Baler . . . . .	Com. P. M. d. Principe	Luzon .	N.-S.	—
" 13	11.45 P.M.	Zamboanga . . . . .	—	Mindanao	—	—
" 18	? P.M.	Iba . . . . .	Zambales . . . . .	Luzon .	—	—
" 20	4-5 A.M.	Batangas . . . . .	Batangas . . . . .	" .	—	—
" 25	3 A.M.	Calapan . . . . .	—	Mindoro .	N.-S.	—
" 25	9.23 A.M.	Manila . . . . .	Manila . . . . .	Luzon .	S.E.-N.W.	Intensity 1°.

If we take, with Dr. von Drasche ("Fragmente zu einer Geologie der Insel Luzon," Vienna, 1878), North Luzon to a little north from 16° N., Central Luzon from there to about 14° 30' N., and South Luzon on the south of this line, we have 11 earthquakes in North Luzon, 15 in Central Luzon, 8 in South Luzon; and on the islands mentioned—1 on Mindoro, 2 on Masbate, 1 on Leyte, and 4 on Mindanao.

There were recorded in the year 1876, altogether 41 earthquakes on the Philippine Islands.

SOME RESULTS OF THE SUPPOSITION OF THE VISCOSITY OF THE EARTH<sup>1</sup>

SIR W. THOMSON'S investigation of the bodily tides of an elastic sphere has gone far to overthrow the idea of a semi-fluid interior to the earth, yet geologists are so strongly impressed by the fact that enormous masses of rock have been poured out of volcanic vents in the earth's surface, that the belief is not yet extinct that we live on a thin shell over a sea of molten lava. It appeared to the author, therefore, to be of interest to investigate the consequences which would arise from the supposition that the matter constituting the earth is of a viscous or imperfectly elastic nature. In this paper these hypotheses were followed out, and the results were fully as hostile to the idea of any great mobility of the interior of the earth as are those of Sir W. Thomson.

<sup>1</sup> Abstract of a paper on the bodily tides of viscous spheroids, by G. H. Darwin. Read before the Royal Society, May 23.

It is first shown that every problem about the strains of an incompressible elastic solid has its analogue touching the flow of an incompressible viscous fluid, and that the solution of Sir W. Thomson's problem of the bodily tides of an elastic sphere may thus be adapted to give the bodily tides of a viscous spheroid. The state of internal flow of a viscous spheroid is then found, under the joint influence of any external disturbing force and of the mutual gravitation of the parts of the spheroid.

When there is no disturbing force this gives the law of the subsidence of inequalities on the surface of a viscous globe under the influence of simple gravitation; and it is suggested that some light may possibly be thrown thereby on the laws of geological subsidence and upheaval. It appears that inequalities of wide extent will subside much more quickly than wrinkles, as might have been expected from general considerations.

The rate is found at which a rotating spheroid would adjust itself to a new form of equilibrium, when its axis of figure is not coincident with that of rotation; and the law is established which