NOTE ON AN INDIAN EARTHQUAKE.

BY

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The advent of the New Year in, round, and about the Bay of Bengal, appears to have been announced by one of the greatest convulsions of nature ever experienced by residents in that quarter of the world. It may not be generally known that at a distance of sixty miles from Port Blair, the Indian Penal Settlement in the Andaman Islands, in Lat. 12° 5′ N. and Long. 94° 0′ E. there is a partially extinct volcanic crater called Barren Island. It is fully described with an illustration in Blanford's "Physical Geography" (published by Macmillan). The island of Narcondam, further North, is also of the same origin—in fact, the Andamans and the Nicobars are only a continuation of the volcanic range of hills along the Arakan Coast, on the East side of the Bay of Bengal, where there are always distinct traces of volcanic action in what is generally accepted as the latest stage. This same range in its southern continuation passes through Sumatra, Java, Bali, Lombok and Sumbawa—this last possessing the most tremendous volcano known.

According to reliable account, the first occurrence of the phenomenon was at 7h. 5m. 45s. a.m. at Madras, in Lat.

Fig.1

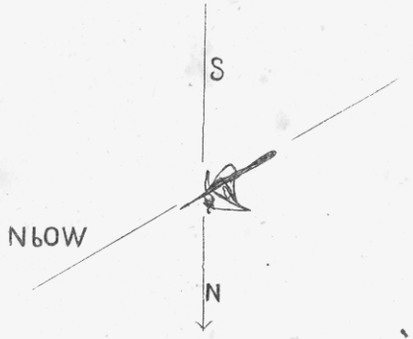

Fig.2

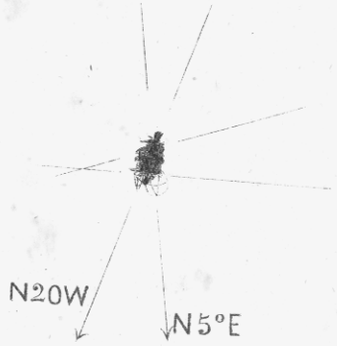

Fig.3

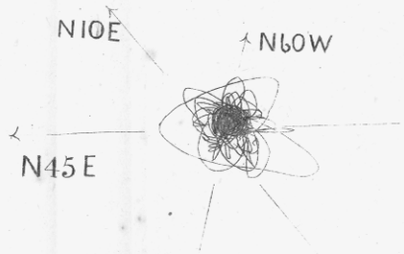

Fig.4

Fig.5

Fig.6

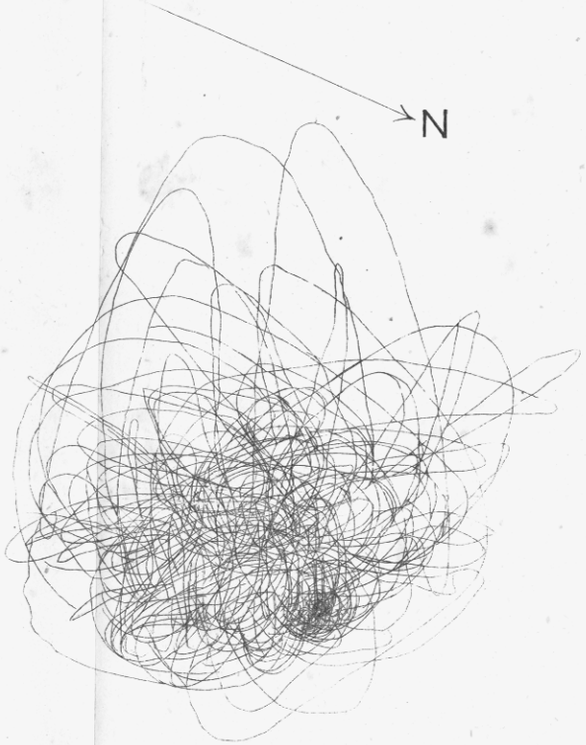

Fig.7

13° 18′ N. and Long. 80° 12′ E. This was particularly observed in consequence of the stoppage of the electrical clock at the Marine Office in that city. This clock, from its delicate construction, was more liable to stoppage from disturbance than an ordinary clock. The *time* noted by it has been confirmed, more or less, after making all the requisite allowances, at all the localities subjoined below, from which records are derived.

Commencing from the Western side of the peninsula along the Malabar Coast, we find that at :—

BOMBAY.—The shock was not felt. Long. 72° 52′ E.

CALICUT and TELLICHERRY.—Further South, slight shocks were experienced.

PAUMBEN and TUTICARIN.—Extremity of peninsula, nothing observed. (?).

PONDICHERRY.—East or Coromandel Coast, 100 miles South of Madras, shock felt.

MADRAS.—Shock described as a slight general commotion, visible motion of household fittings and fixings, but no damage. No mention made of rise and fall of sea.

VIZAGAPATAM and VIZIANAGARAM. — 500 miles North of Madras, shock felt.

In the intermediate interior country :—

BANGALORE.—On a plateau, felt severely.

WYNAAD.—Junction of East and West Ghants ; shock created a panic.

In Bengal and Northern India, we find that at :—

CALCUTTA.—The shock was felt. Long. 88° 27′ E.

KHATMANDER.—Nepal, on Himmalayas, Lat. 27° 45′ N. and Long. 85° 18′ E. where the tremor was accompanied by a rumbling noise.

In the Bay of Bengal and Indian Ocean we find that at :—

PORT BLAIR.—Adamans, the shock occasioned considerable damage, overturning a chimney and cracking several large brick and masonry structures. Sea much agitated, and breakers.

5° 55′ N., 92° 49′ E.—Ship *Commonwealth*, at sea. Quake felt.

CEYLON.—Shocks reported at Kandy, Jaffua, and other parts of the island.

Along the Arakan Coast on the East side of the Bay of Bengal we find that at :—

AKYAB.—The shock was felt.

CHEDUBA. — Accompanied with volcanic eruption, great volumes of flame, smoke, etc. Long. 92° 40′ E.

In the interior of Bengal at :—

PROME.—Shock felt. About same parallel as Akyab, but 100 miles West.

RANGOON.—Shock not felt, Long. 96° 23′ E.

From these facts and figures we are enabled to ascertain that as the wave was confined between Bombay and Rangoon, in which places its effects were not experienced the highest and lowest *observed* limits, are, respectively, Lat. 27° 45′ and 5° 55′ North. A careful analysis of the different accounts shows that the line of motion is *nearly* North and South ; or more correctly, East by North and West by South would be the true course of the oscillation. Its *direction* is, however, uncertain—that is whether the vibrations proceeded *from* a North-East point or *to* it. The whole time of duration from all accounts, appears to be about four minutes, including two *distinct* shocks—the second stronger than the first. The most interesting occurrence in connection with the phenomenon is the volcanic display at Cheduba, where petroleum wells are being actively worked, and where apprehensions were current as to the supply being injured. It is fully des-

cribed in an official memorandum by Colonel Sladen, Divisional Commissioner, which is hereunder reproduced *in extenso.*

'I have the honour to report a rather interesting phenomenon in connection with the shock of earthquake, which was felt at this station on Saturday morning last, the 31st December.

' 2.—The vibrations commenced at about 7.55 a.m. and were continued at intervals from 10 to 15 minutes. They were not severe, but doors and windows of houses rattled, furniture was made to undergo a sea-saw movement, and pendulum clocks in some instances stopped.

' 3.—I was myself at the time on board the S. S. *Mahratta,* off the mouth of the Sandoway River, and the point of interest in relation to the earthquake is that, simultaneous as regards time with its occurrence at Akyab, we were eye-witnesses of one of those violent volcanic eruptions, which have already been observed to take place on some of the islands lying off this coast during the great earthquakes of 1833 and 1839.

' 4.—In the present instance, the eruption occurred in one of the extinct volcanoes near the southern extremity of Cheduba Island.

' As we were lying at anchor at the time off the mouth of the Sandoway River, we must have been about 30 miles from the scene of the volcano, but even at this distance, a dense column of smoke and broad massive flames of fire were seen to rise, as it were, from the horizon, and stretched far up into the distant sky.

' Viewed even by daylight, the sight was a magnificent and impressive one, owing to the great volume of flame, and the immense height to which it rose. Mr. McClelland, writing of the eruption in 1833, says that the flames issued to the height of *several hundred feet;* and the description given in Silliman's journal of a similar eruption in 1839,

is to the effect that, "fire, mingled with smoke and ashes, rose to a *fearful height*."

'5.—In these two instances, the observers were within 3 or 4 miles of the eruptions. In the present instance, we were 33 miles in a straight line from the scene of the eruption, and at that distance the flames as seen by us appeared at times to reach half way up from the horizon to the sky and to have a lateral (apparent) breath of from 30 to 40 feet.

'They continued to issue forth with greater or less effect, for about 15 minutes and then suddenly disappeared, but the smoke which had risen in a long straight column formed itself into a vast black canopy, which hung like a cloud in the sky, and was visible for hours after the eruption was at an end.

'6.—I may mention that the high land of Cheduba was quite visible from where we were, and that bearings, taken at the time, indicated the scene of the eruption to be the extinct volcano known locally as the "Naga Dwen."'

The rare occurrence of these phenomena and the alarm generally associated with them, preclude the possibility of reliable observations from the great majority of those capable of recording them. It is much to be regretted that no provision for seismological observations appears to have been made anywhere by the Indian Government. It is only necessary to add that in the facts adduced from different localities, all extraneous or unnecessary and doubtful matters have been carefully eliminated, and in many instances the points noted have been corroborated by two and three different observers.

P. S.—The following additional information is confirmatory of the observations and conclusions detailed in the preceding paper :—

LAHORE.—**Shock not felt.**

HYDERABAD.—Deccan, shock not felt.

TREVANDRUM.—Malabar Coast, South of peninsula, slight shock felt.

GOPANDPORE.—Coromandel Coast, North of Vizacapatam, shock felt distinctly.

CEYLON.—Colombo, shock felt right across the island—strong vibration.

A great many opinions are in favor of the view that the wave proceeded from about a northerly point southwards. The probable line of action, as already stated, is, in consequence, a closer approximation to the *true direction.*