case. They have not fared any better than ordinary folks even at Monte Carlo where the protoplasmic interference with the turn of events is minimal.

When the leaders of nations choose between peace and war they do not do so in an atmosphere of higher and pure mathematics.

THE HIGH THRESHOLD OF LIFE DEFIES MICROMATHEMATICS

The *threshold* is familiar to physiologists. Vital receptors take no cognizance of what comes to them unless it is worth considering. That is why micro-mathematical quantities are without effect. Even the non-living products of living organisms are imbued with the same peculiarity of reaction. The physical basis of the peculiarity in either case is the highly complicated structure of the protein molecule.

Thresholds are known in the behaviour of non-living matter. Flow of electric currents shows a hesitancy under certain conditions. Certain chemical reactions appear to sit on the fence for a while. The *quantum* is essentially a threshold effect. Biological thresholds are much higher.

When a case of pneumonia approaches the crisis the physician in attendance may visualize the psyche perched precariously on a very high threshold. It will either tumble back into the weary body or glide forth into the Great Beyond. Micromathematics does not reach the threshold and does not help in the treatment or prognosis.

[1] Holmyard, E. J., *Biology for Everyman* by the Late Sir J. Arthur Thomson (J. M. Dent & Sons, Ltd., London), 1934.

[2] Ride, L., *Genetics and the Clinician* (John Wright & Sons, Ltd., Bristol), 1938.

[3] Hewlett, R. T. and McIntosh, J., *A Manual of Bacteriology* (J. & A. Churchill, London), 1932.

A PRELIMINARY NOTE ON THE SEVERE MEXICAN EARTHQUAKE OF APRIL 15, 1941

BY

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AN earthquake shock of severe intensity rocked Mexico at $19^h 29^m$ Greenwich Mean Time (roughly about 13^h Mexican Standard Time) on Tuesday, the 15th April 1941. It is too early to get complete reports of the extent of area affected and the amount of damage caused; but the reports so far available from Mexico City state that the number of persons killed there exceeds 250 and that two towns, *viz.*, Tecatelan and Tuxpan in the State of Jabisco, have been wiped out. Many persons are reported to have been killed in the villages along the coast. Nearly three-fourths of the houses in Colima City have been either damaged or destroyed. A report from Vichy, supposed to be based on a message from Mexico City, states that most of the 15,000 inhabitants of the city of Colig are believed to have been either killed or injured. The volcanic group near Colima is reported to be in eruption and a tidal wave along the Jabisco coast has caused destruction to life and property in many villages. It would naturally take some days before the final casualty list will be available to us, but it is expected to be fairly heavy, judging from the nature of destruction.

Past history shows that the Mexican region is liable to experience severe earthquakes occasionally. During the last 13 years this region has felt as many as seven shocks of severe intensity including the present one. The extent of damage to life and property during these shocks varied to different degrees. The dates of occurrences of these shocks together with a brief description of the extent of damage done are given in Table I.

According to Milne's Catalogue[1] of Destructive Earthquakes, the total number of destructive earthquakes of intensity III (those that destroy towns and desolate districts) during the 17th, 18th and 19th centuries were 11, 8 and 16 respectively.

Epicentre of the Earthquake.—The seismographs at all the Seismic Stations of the India Meteorological Department, namely Bombay, Calcutta, Agra and Kodaikanal, as also those of the Nizamiah Observatory at Begumpet and the Haig Observatory at Dehra Dun have recorded this shock as one of great intensity. All the four departmental Seismic Centres have recorded P′ as the first movement and that with an 'emersio'. SS is clearly recorded with an 'impetus' at all the four stations; the calculation of the

The Great Mexican Earthquake of April 15, 1941. Colaba Seismogram (Milne-Shaw Seismograph, E-W. Compt.).

TABLE I

Date of Earthquke	Intensity of shock as reported by the Press	Brief details of the extent of damage done	REMARKS
1931 Jan. 15	Violent (sharpest tremors ever experienced)	119 killed. Damage to buildings and property	
1932 June 3	Very severe	Widespread damage ; more than 300 killed (reported to be the worst shock during the decade)	Shock of very great intensity by Bombay records
1934 Jan. 28	Severe	Many buildings damaged and several people injured	
1934 Sept. 19	Severe	9 killed and 200 injured	Phase movements in Bombay. Seismographs too feeble to be identified
1937 Dec. 23	Severe	Several houses severely shaken	
1940 May 19 or 20	Severe	9 dead and several injured	Movements too feeble in Bombay, records to be identified
1941 April 15	Severe	More than 250 killed and several towns demolished	Further details lacking at the time of going to Press

epicentral distances has been based on the SS–P' difference. The times of P' and SS as reported by these centres together with the calculated Δ (SS–P') are given in Table II.

TABLE II

Station	P' time (G M T.)	SS time (G.M.T.)	Δ
	H M S	H M S	°
Agra	19 29 14	19 49 29	134·1
Bombay	19 29 23	19 51 05	142·6
Calcutta	19 29 09	19 51 06	144·1
Kodaikanal	19 29 44	19 52 27	148·9

The tentative epicentre based on the above data with slight adjustments came to Lat. 15° N. and Long. 92° W., to the south-eastern border of Mexico.

Depth of Focus.—Without the seismograms from other centres no precise determination of the depth of focus of the earth-quake is possible. The nature of the Colaba records, however, suggests a depth of focus in the neighbour-hood of 120 Km.

During recent years (1932–39) this Mexican area has experienced Deep Focus Shocks[2] with epicentres varying between Lat. 12° N.; Long. 87·50° W.; and Lat. 18·75° N.; Long. 101·75° W. The depth in these cases varied from 70 Km. to 150 Km. Gutenberg and Richter have opined[3] that intermediate shocks (those with depths between 60 Km. and 250 Km.) occur in Mexico.

Magnitude and Energy.—Using the formulæ[4] $\log E_0 = \log E - 2M$ and $M = \log a - \log A_0 - 2·5$, the magnitude and energy of the present Mexican 'Quake come to 7·7 and 10^{22} ergs respectively. The energy is equal to that of the Chilean shock of January 25, 1939, and ten times that of the Anatolian 'Quake of December 27, 1939.

As already stated, the telegraphic reports from the Departmental Seismic Centres point to a region near the south-east border of Mexico. In the absence of detailed reports regarding the extent of damage done, it is difficult to judge the preciseness of the tentative determination of the epicentre.

The Milne-Shaw Seismogram (E.-W. Compt.) of the Mexican Earthquake as recorded at the Bombay (Colaba) Observatory is reproduced in the figure.

1 *Br. Adm Rept.*, 1911, p. 679.
2 Gutenberg and Richter, *Bull. of Geol. Soc. of America*, **50**, p 1514.
3 *Internal Constitution of the Earth*, p 293
4 Gutenberg and Richter, *Gerlands B. Z. Geophysik*, **47**, p. 122.