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For discussing the distribution of epicentres of great earthquakes over the world, it is necessary to rely on exact seismometry, as they are sometimes located far from civilized countries and many are found in ocean beds. Delicate seismometers do not fail to record the trace of world-shaking earthquakes, although the epicentres are remote from the place of observation. The records till the end of the last century are liable to miss distant occurrences, so that it seems safer to base the discussion on those which took place since 1900.

Examining the chart of the epicentres given by Prof. Imamura in Rikwanenpyo, we are at once struck by the existence of two distinct belts, which may be denoted by (A) and (B), as shown in the figure, in which the epicentres 1) are given by O, and great volcanoes by +. (A) extends from Eurasia to Indonesia and Melanesia, and (B) from Aleutian, Kamtchatka, Japan, Philippines to Java on the continental margin on one side, and to America on the other.

Considering the earth as a sphere, (A) nearly coincides with the equator and (B) with a meridian circle with the north pole at 140°W and 47°N. According to the theory of pole wandering by Köppen and Wegener, the above point was approximately the position of the north pole in the cretaceous period, and it travelled westward to 160°W 45°N in the eocene period.

When the earth cooled from the molten state, the rotation was more rapid and the eccentricity greater than at a later geological period. So long as the crust remained thin, the accommodation to diminished speed of rotation and eccentricity can be effected by partial fracture of the crust in small parts, but as the earth advanced in age, the crust became thicker and the accommodation was evidently accomplished by deep fractures, which correspond to the disruption of a gravitating shell filled with plastic matter in elasticity. As the earth is gradually approaching a sphere and contracting, the surface decreases.

1) Earthquakes before 1900 are shown by ⧫ and ⧫, as used in the Proc. 9 (1933), 207.
in area, producing foldings and crumplings. Evidently the length of the equator diminishes and the poles rise, but the variation is greatest at the equator, where there is much folding. If the pole wanders, there is further difficulty in the accommodation, as the equator is equally changing its position. Owing to the plasticity of the magma and the crust, the earth can yield only to a limited extent to the action of stress called forth by the displacement; otherwise there is fracture. The probable history seems to be that in the mesozoic age, the crust increased in thickness and the contraction reached to such a stage that the equilibrium with the magma was nearly unsupportable; it broke down, producing great fracture near the equatorial belt, which suffered greatest change during the past ages and where the centrifugal force has markedly diminished. Such fracture can lead to world cataclysms, and leave scars which do not heal for ages after. (A) seems to be the remnant of such a catastrophe, by which the old fauna disappeared and the new began to appear: this is characteristic of the close of the mesozoic age and the beginning of the tertiary. It is probable that the pole is to be placed at the epoch of transition from the cretaceous to the tertiary. Köppen and Wegener do not consider the position of the pole as exact, a difference of 5° being possible. Making this allowance, the centres of world-shaking earthquakes at present lie nearly on the equatorial belt of the cretaceous-tertiary period.

There may have been other causes acting to induce fracture at that epoch. After the surface has cooled down, the radioactive heating of the earth's interior reached such a stage as to break up the crust. Another possibility is a great magmatic change, consequent upon the cooling of the earth. Other causes can be suggested, but in the present communication only some hints are given.

Owing to the difference in the nature of the crust composing the continents and the ocean bed, the margin between the two is liable to fracture. Such seems to have taken place simultaneously with the fracture of the equatorial belt, nearly following the meridian passing near the Asiatic continent on the east and along the west side of N. America, as indicated by the curve (B). It may however be doubted by those who believe in the continental drift of America, that the scars left by the fracture during the transition period between the cretaceous and the tertiary cannot leave their trace in the displaced position. It is, however, probable that the fracture went deep into the glassy magma, and if the continents came over it, the abyssal
crevasse remained still as a source of instability, by causing earthquakes and volcanic eruptions.

The formation of these belts is probable; reasoning from the theory of elasticity, there is another possibility of the fracture entering along the meridian (C) perpendicular to (B). Not far from this circle are found Hawaii, Iceland, Basutoland, New Zealand, Kermadec and Tonga, of which the last two are associated with well known deeps, perhaps marking the remains of ancient fracture. At present swarms of earthquakes frequent Melanesia and adjoining islands, but they seldom pass out of the (C) belt, as shown in the figure.

Following a main fracture line, there are generally fractures of smaller extent running nearly perpendicular to the principal, as usually observed in brittle substances. Examining (A), we notice a number of such occurrences: i.e. in the Mediterranean, Asia Minor, Persia, Hindukush, W. China, Indonesia, Micronesia and Melanesia; in (B) we find Aleutian, Kamtchatka, Japan, and Coast of China; in (C) Mexico, Central America, and north of South America.

It may be objected that the coincidence of the past equator with earthquake and volcanic zones in Indonesia and Melanesia is not well fulfilled. We have however to remark that Sumatra and adjoining regions were disturbed during the tertiary by the change in latitude and consequent geomorphic transfiguration. The transposition of the equator during the quarternary seems to have still left another residual effect as explained in another communication. It is further to be noticed that the lines of fracture are not at all regular; it is only in broad aspect that we can speak of a fracture line, which in actuality departs far from being in any way a regular geometrical curve. As to the detailed discussion of the earthquakes in the said region, there are many points to be examined, especially the direction of numerous archipelagos scattered in the Pacific Ocean.

The existence of three belts (A), (B), (C) of great earthquakes proves that we are now experiencing after-shocks of extremely violent earthquakes of former geological ages, unparalleled to what we meet in the present relatively quiet period. The earth towards the end of the mesozoic age was disturbed to such a degree that in the following tertiary, the surface underwent great transfiguration by the appearance of many high mountain ranges. Even the living organisms seem to have suffered a great change between these ages. In the present stage, we are still tormented by the great earthquakes and eruptions, probably inherited to future periods by the great cataclysm, which devastated the earth many million years ago.