

THE EPICENTRES OF EARTHQUAKES IN RELATION TO THE MID-ATLANTIC RIDGE AND THE CARLSBERG RIDGE IN THE INDIAN OCEAN.

by

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The concentration of a very large number of earthquake epicentres in the vicinity of the great chain of mountains which follows the entire west coast of the American Continent, and which is frequently accompanied in the Pacific, immediately adjacent, by a series of elongated troughs extending in the same direction, has been ascertained for some time and appears to correspond very closely to the line of rupture of the terrestrial crust. Analogous conditions are encountered in the Pacific along the garlands of islands such as the Kermadec, Tonga, the Mariana, Bonin, Japan and Kuril Islands.

The epicentres recorded in the middle of the Atlantic Ocean and the Indian Ocean are much less numerous and do not appear to present the same character. The Atlantic Ocean is traversed throughout its entire length, from North to South, by a great ridge of mountains generally submerged to more than 1000 metres (550 fathoms), which pierces the surface only at some few islands. This chain of mountains presents a close analogy in shape to that which follows the west coast of the Americas, but it is not, as the latter, associated with long and narrow trenches, except possibly near the small Romanche Deep, located near the Equator in a region where seismic disturbances are particularly numerous.

The Indian Ocean also is traversed by a ridge, a part of which, the Carlsberg Ridge, named by Dr. J. Schmidt and explored principally by the Mabahiss Expedition, extends from Socotra to the Chagos Archipelago. It does not appear to be accompanied by extensive trenches.

The International Hydrographic Bureau having received from Ethel F. Bellamy, of the Oxford University Observatory, a rather complete list of the earthquake Epicentres observed between 1913 and 1932 (inclusive), it appeared of interest to plot these positions on a reduction of our General Bathymetric Chart of the Oceans, tracing on it the principal depth contours and indicating, by the number of circles surrounding the position points, the number of times each particular epicentre has been recorded. The reduction in scale is slightly less than three times ; at the Equator it has a scale of 1 : 28,544,600. The conditions can be better appreciated, however, by reference to the Bathymetric Chart itself.

On the chart of the Atlantic one can ascertain that there are few epicentres outside of the Great Central Ridge, which we have delimited by the depth contour curve of 4000 metres (2200 fathoms). Nine epicentres

only, representing 10 out of 205 seismic disturbances, or 5 %, lie in depths greater than 5000 metres (2700 fathoms) ; 27, representing 41 seismic disturbances, or 20 %, lie in depths between 4000 (2200 fathoms) and 5000 metres (2700 fathoms), and 90 representing 154 seismic disturbances, or 75 %, lie in depths of less than 4000 metres (2200 fathoms). The epicentres are much less numerous in the South than in the northern hemisphere, a fact which does not appear to be fully explained by the fewer number of observation stations. There seems to be a very particular concentration of epicentres near the Equator, in the vicinity of the Romanche Deep, and then near St Paul's Roc . After an interruption, the epicentres appear to follow almost exactly the line of the crest of the ridge and are very numerous on the plateau of the Azores Islands, and show a particularly active centre towards the southern extremity of the great head of the depths of less than 2000 metres (1100 fathoms), which represents the prolongation of Iceland towards the southwest. One might state that in general the most active epicentres are found where the ocean bed is most broken and uneven. We invite attention also to the epicentre outside of the great crest of the ridge, lying in latitude 44°0 N. and longitude 20° O. W. near which there is at the same time a small peak of 1790 metres (990 fathoms) and a local subsidence to 6325 metres (3500 fathoms).

On the chart of the Indian Ocean, the indications of seismic disturbances are much less numerous ; we note 43 epicentres for 49 shocks, if we take into consideration the epicentre situated at latitude 34° S. and longitude 57° E. where 42 shocks were observed during five years and which lies to the southeast of Madagascar in a region where the depths are very little known, but where soundings of less than 2000 metres (1100 fathoms) have been observed.

We find six epicentres on the great plateau of less than 3000 metres (1650 fathoms), depth, terminating at the S.W. end in Rodriguez island, then in the northern hemisphere seven epicentres of which the positions coincide with those of depths of less than 3000 metres on the Carlsberg Ridge.

We see the importance which attaches to the study of the form of the ocean bottom, from the point of view of the geologist, and even though this study is still rather incomplete, it already permits one to glimpse new problems in the formation of the earth's crust, which are different from those encountered on the part of the earth's surface no longer submerged.

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