VIII. THE EAST PACIFIC RISE

Evidence gathered by expeditions of the University of California's Scripps Institution of Oceanography during the International Geophysical Year suggests that the East Pacific Rise is one of the largest physical structures on earth. It runs in a sickle-shaped curve from near New Zealand 8,000 miles to the coast of Mexico. There its crest disappears from the maps, unless, as some now think, it underlies the western part of the North American continent. If so, then a previously described shoal area off the coast of Canada, reaching almost to Alaska, can be considered the northernmost end of the crest of the Rise. This would bring the total length to about 10,000 miles.

Although the crest lifts itself two miles above the floor of the Pacific it still lies one and a half miles below the ocean surface, except where volcanic islands, such as Easter, thrust upward atop the bulge of the Rise.

The Rise is part of a system of shoal areas found in all the oceans. The Mid-Atlantic Ridge is another arm of the system, as is the Mid-Indian Ridge in the Indian Ocean. The crests of these ridges are in the centers of the oceans, that of the East Pacific Rise lies at the eastern edge of the Pacific. In contrast to the Mid-Atlantic Ridge, the western approach to the crest is remarkably gentle, the sea floor rising at about ten feet a mile. Hawaii lies west of the westernmost edge of the Rise. The sea floor thus slopes downward from the California coast all the way to Hawaii.

Four characteristics of the Rise are: 1) like other ocean ridges, it is the site of many shallow earthquakes; 2) beneath its crest the crust of the earth thins out, becoming two miles thick rather than the three miles of typical ocean basins, and perhaps twenty under the continents; 3) heat is flowing through the crest at a rate of as much as eight times that in the deep ocean floor or on land, and to the flanks the rate of heat flow is much less than elsewhere; 4) the Rise is intersected by as many as eleven narrow mountainous belts (fracture zones) that run almost due east-west. These fracture zones contain most of the volcanoes, extinct or active, found in the eastern Pacific. These zones mark sharp changes in direction of the crest of the Rise and abrupt changes in elevation.

Using maps of magnetic anomaly, scientists have discovered that the actual movement of the earth's surface can be clearly traced. The lines of magnetic anomaly run generally north-south and form a pattern. Maps prepared by the Scripps Institution show that across the fracture zones off California the pattern is interrupted, but can be reconstituted by shifting

the maps back and forth. In one place, the pattern may have been moved to the right by a hundred miles or so. In another, the movement may have been almost a thousand miles. Earth movements on this scale are unknown on land.

To explain the Rise, it is hypothesized that in geological terms it is a fairly recent feature of the earth's crust, akin to such ancient rises as that in the Central Pacific upon which the Hawaiian Islands have built themselves. Perhaps the earth has been bowed up by a vertical current in the hot materials of the earth's mantle, materials that at weak points in the structure find their way to the surface as volcanoes. It is postulated that this great convection cell below the Mohorovicic discontinuity explains the curious pattern of heat flow mentioned in 3) above.

More details can be found in a paper by H.W.Menard, Science 132 (1960) 1737-1746, 7 fig.

VARIA

"It is there indeed well said, that a long course of observations in the Tropics must convince anybody of the inconvenience, almost even the absurdity, of hair-splitting. What magnificent sport would a true species-maker find here, among the Scitamineae, the smaller Scrophularineae, and even the palms! to say nothing of ferns. Melastoma Malabathrica is good, I think, for twenty species at least, ..." (Motley in Hook., J.Bot. & Kew Gard. Misc. 9, 1857, 149-150)