

## DISCUSSIONS AND REPLIES

### 'The New Global Tectonics': Age of Linear Magnetic Anomalies of Ocean Basins: Discussion'

R. A. FACER<sup>2</sup>

Wollongong, N.S.W. 2500, Australia

The uncommitted may have welcomed the two recent informative papers of Meyerhoff and Meyerhoff (1972a, b) insofar as they provided potential reasons for delaying a decision on whether or not continents drift. However, some points raised in their papers should be interpreted a little cautiously. The first paper (Meyerhoff and Meyerhoff, 1972a) should be noted by both "drifters" and "non-drifters," but, because it is a review article it will not be commented on here. Meyerhoff and Meyerhoff (1972b) did, however, contain several points which warrant discussion.

Meyerhoff and Meyerhoff (1972a, p. 269) noted " 'The new global tectonics,' therefore, cannot be ignored, nor can they be accepted blindly." Although many readily accept continental drift as (almost) fact, there are still those who just as strongly reject the "new global tectonics." (In this discussion "continental drift" and "the new global tectonics" are, perhaps loosely, considered as synonymous terms.) Room still exists for active discussion on this most exciting topic (*vide*, for example, v. 56, no. 2, of this *Bulletin*). The interesting suggestion of Meyerhoff and Meyerhoff (1972b) that the marine magnetic anomalies are of probable Archean age could drastically change concepts of sea-floor spreading—but a few points of their proposal may reduce its ready application.

Concerning marine magnetic anomalies Meyerhoff and Meyerhoff (1972b, p. 338) stated, "Asymmetry is the rule, and symmetry is the rarity." Although many anomalies are symmetrical about the midocean ridges, it may be said that symmetry could be an unusual feature of midocean rifting. Figure 1 is an attempt to represent a simplified model of such rifting. This model assumes a single fracture and central extrusion. Figure 1a shows a series of "blocks" across a ridge at time "zero." At some later time "one" the ridge has spread—asymmetrically (Fig. 1b, c) or symmetrically (Fig. 1d). For single fractures the break probably would occur between blocks, which may give rise to a configuration like that shown in Figure 2. Twin fractures (e.g.,

between blocks 1 and 2, and 2' in Fig. 1) would need to be synchronous for symmetry to be maintained, and block 1 would either be very old (even ?near-original ocean floor) or, if covered by extrusions from the fractures and sediments, a continuously subsiding block. These two alternatives, especially the latter, could reflect median-valley topography of midocean ridges. The former alternative could fit the suggestion of Meyerhoff and Meyerhoff (1972b, p. 355). Asymmetry would be a more likely geometric development, and hence the doubt expressed by Meyerhoff and Meyerhoff (1972b) regarding magnetic anomalies may be less significant as an argument countering sea-floor spreading.

Recently a possible model of global plate tectonics was presented by Duffield (1972) to provide an alternative example of asymmetric spreading. Duffield (1972) described the 1969-1971 Mauna Ulu eruption at Kilauea volcano, Hawaii, during which a lava column developed a crust that migrated about the vent, presumably in response to convection within the underlying molten lava. In his Figure 5, Duffield (1972, p. 2548) presented a photograph showing crustal formation by spreading in which "asymmetry of the rate of spreading . . . is shown by the different widths of the newly formed crust on opposite sides of the zones of spreading." If, as Duffield (1972, p. 2543) suggested, "the eruptive activity . . . provides an active model of global plate tectonics," then asymmetry of spreading analogous to that modelled in Figure 1 is "normal." Duffield (1972, Fig. 5) also showed variations in width of the new crust *along* the zone of formation.

Naturally a high degree of asymmetry of ma-

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<sup>1</sup>Discussion received, July 25, 1972; accepted, January 8, 1973.

<sup>2</sup>Department of Geology, Wollongong University College.

Several colleagues and students have helped me through discussion on this controversial subject. E. R. Phillips and A. J. Wright kindly read the manuscript and, although offering helpful comments, do not necessarily agree with the thoughts presented.