LETTERS TO THE EDITOR

ASTRONOMY

Surface Relief of Mars

The first reports from *Mariner IV* indicate that the planet Mars possesses a negligible magnetic field when compared with that of Earth. This is strong confirmation of the view that Mars has not developed a core. In a recent communication to *Nature*[1] we suggested that a cyclical process which can be discerned in the Earth's history, and is responsible for its major geological structures, is related to the development of the Earth's core. If our arguments are valid, then it can be predicted that Mars will not possess any system of orogenic mountain belts comparable with those of Earth. Any relief on its surface would be of volcanic or volcano-tectonic origin as on the Moon.

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[1] Fitch, F. J., and Miller, J. A., *Nature*, **206**, 1023 (1965).

OCEANOGRAPHY

Morphology of North Macquarie Ridge

Soundings in the Southern Ocean between New Zealand and the Antarctic continent have been sufficient to permit definition of a general elevation of the sea floor extending from the Balleny Islands region, across the Pacific Antarctic and Indian Antarctic Ridge junction, north through Macquarie Island towards New Zealand. This elevation, the Macquarie Ridge, is commonly depicted on bathymetric charts either as a substantially continuous feature at least as far north as Macquarie Island with its crest lying in depths between 1,000 and 2,000 metres; or as in the chart utilized by Adie[1], with an extensive deep water gap separating the northern end of the Ridge from New Zealand.

For a number of years the N.Z. Antarctic Research programme has included studies of the Macquarie Ridge between the Antarctic continent and New Zealand carried out by the New Zealand Oceanographic Institute and Geophysics Division, Department of Scientific and Industrial Research.

The principal geological objectives have been to define the morphology of the Ridge and to elucidate its structure. The aim of zoological work has been to throw light on the biogeographic relation of the benthic fauna of the New Zealand region with that of various areas to the south and on the ridge as a faunal dispersal route.

The question whether the elevation on which Macquarie Island lies extended north to New Zealand as a major ridge has hitherto been unresolved. Herdman stated[2] that "On the (sounding) evidence now available it appears . . . that the existence of a connection between New Zealand and the Macquarie Rise is doubtful".

Fell[3], in discussing the biogeographic relationships of the New Zealand and Antarctic echinoderm faunas, stresses the apparent differences between the Macquarie Island and New Zealand elements, and correlates these with the circumstance that "Macquarie Island . . . stands in deep water" and there is " . . . no available shallow water route between the two regions".

In discussing the hydrology Deacon[4] states: "The bottom topography south of New Zealand is so irregular that the eastward current (of deep water) must be interrupted by numerous eddy movements. . . . The deep channel between the New Zealand shelf which extends as far south as the Campbell and Auckland Islands, and the Antarctic shelf, is less than 1,000 miles wide and is obstructed by several shallow banks and islands. A preliminary examination of our soundings . . . suggests that the bottom topography is even more rugged than has hitherto been supposed".

In view of the significance, in the three fields of geology, zoology and hydrology, of proper resolution of the question, numbers of echo-sounding traverses have been made in a south-east–north-west direction from the Foveaux Strait region just south of New Zealand to 58° S. of Macquarie Island. These traverses have extended from the Campbell Plateau and South-western Pacific Basin west to the Tasman Basin; each of them crossing the possible location

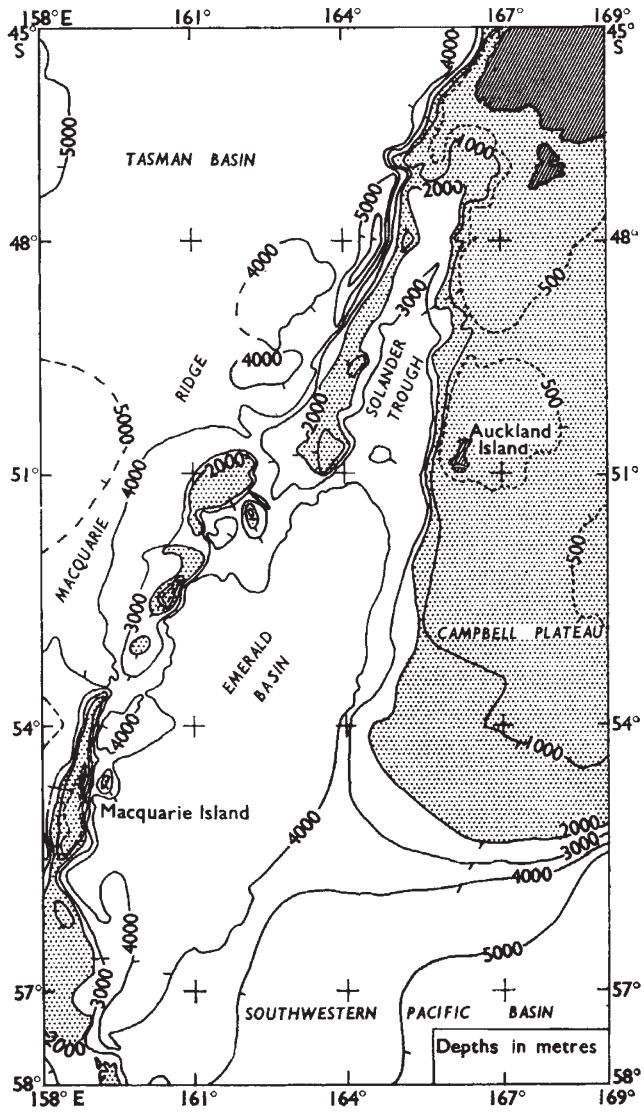

Fig. 1