Foreword

The editors of this excellent symposium have done me the honour of inviting me to write an introduction to the proceedings. Although flattered I am surprised, for I have not worked nearer to the area than the outcrops of Tertiary lavas on Baffin Island and I have long been engaged in administrative work.

I shall therefore leave to others discussion of the detailed evidence around Nares Strait and draw attention to two broad aspects which must influence thinking on the subject.

One is the revolution in the earth sciences which culminated less than 15 years ago. Plate tectonics is the theory which resulted, but the cause of the revolution was the success of new methods in interpreting the ocean floors, the Earth's interior, palaeomagnetism and radiometric ages. These observations are quite secure and demand explanation as much as do observations by traditional geological methods.

Fifty-five years ago, when Noel Odell first introduced me to geology, little was known of geophysics or geochemistry. As one distinguished geologist stated geological mapping was both the method and the sole aim of the earth sciences. Theories were scoffed at as 'armchair geology'. Those acquainted with other sciences were puzzled because these had excellent theories.

One explanation of this lack in geology which was never mentioned or even considered was that Wegener might be right. If so it was indeed futile to try to use a fixed, unchanging model to theorize about a mobile Earth.

Nevertheless the revolution did come and like other revolutions was not introduced nor welcomed by the establishment. The geological surveys, university departments of geology, the mining industry and the petroleum companies all were opposed to change. The new methods were introduced by physicists with no formal training in geology who included Wegener, Vening Meinesz, Rothe, Gutenberg, Aston, Nier, Ewing, Bullard, Runcorn, Mackenzie and many oceanographers, while the new interpretations were for the most part suggested by geologists who had more physical training or insight than most, men such as Daly, Holmes, Carey, Irving, Hess, Vine, Morgan and Le Pichon or those few like Argand and du Toit whose field work had shown them particularly clear illustrations of continental motions.

The new ideas were not popular. All of us who had to change our minds realize how difficult it was and many older geologists still wish for a miracle that would disprove the new ideas.

I clashed with some of them early when mapping near Great Slave Lake where, following C. H. Stockwell and A. W. Jolliffe, I found evidence of great faults and superb foliation. Both suggestions were unpopular with geologists who believed that contraction was the sole source of motion in the Earth and that all the basement rocks had crystallized from molten magmas. Later I was involved in debates with those who opposed large motions on the Great Glen, San Andreas, Alpine and Jordan Valley faults. That these motions are now accepted does nothing to prove that there has also been extensive motion along Nares Strait, but shows that there has been a history of disbelief in large fault displacements.

This revolution has gone so far that two sea-going physicists recently published a long paper giving a precise account of the opening of the whole South Atlantic Ocean with scarcely a reference to the coastal geology and none to that of the islands along the mid-ocean ridge.

This brings me to the second broad concept which I wish to discuss. Some authors take the parochial view that the amount of displacement along Nares Strait provides a test of the theory of plate tectonics. I doubt this.

Everyone seems to admit that field geology, air photographs and an argument concerning the origin of linear features all suggest at least a small displacement.

Those who do not accept a large motion suggest that the geology on the two sides matches too closely to admit of it, but if, instead of sea, Nares Strait were land, how many field geologists would accept such a correlation in mountainous and Precambrian terrain without mapping the gap of 24 kilometres between the sides? Unfortunately, there is as yet a shortage of clear geophysical data from the sea floors in the Strait and in all the adjacent region.

In any case alternatives are not confined to a simple choice between great displacement along both Nares Strait and Baffin Bay or slight motions in both cases. Account must be taken of the origin of Lancaster and Jones Sounds. K. Burke has suggested that they may be spreading aulacogens and motions in other places could be hidden by ice or in complex geology.

The whole Atlantic Ocean appears to be an entity whose different parts spread by similar but not contemporaneous movements.

First about 190 million years ago following uplift, rifting and intrusion between the Mediterranean and Caribbean areas, North America separated from Africa. The Azores and a ridge to Gibraltar still indicate one boundary.

About 130 million years ago spreading began be-

tween South America and Africa. Principal areas of outpouring left lavas of that age on opposite coasts and formed such trails as the Cape, Walvis, Rio Grande, Guinea and Sierra Leone rises. The hot spots which formed these are still evident as the volcanic or uplift islands named Bouvet, Tristan da Cunha, Gough, Ascension and St. Paul's Rocks.

The separation of North America, Greenland and Europe involved two spreading ridges. One extends from a triple junction south of Greenland through the active hot spots of Iceland and the island of Jan Mayen, to the De Geer Line which cuts across from south of Spitsbergen along the northeast coast of Greenland, to the Yermak hot spot north of Greenland. The other ridge extended from the same triple junction to the Yermak hot spot through an extinct hot spot presumed to have lain under Davis Strait. Several of these hot spots left trails of which the earliest evidence is the outcrops of early Tertiary lavas on Cape Dyer, Baffin Island, on the east and west coasts of Greenland and on the Faeroe Islands.

The concept that the Atlantic Ocean, Norwegian Sea and Baffin Bay all opened along lines joining hot spots is derived from H. Cloos' suggestion for the origin of the Rhine Graben, the Red Sea and the Gulf of Aden.

According to this view, which many geophysical data and Tertiary geology described in papers in this symposium supplements, there is much that is interesting but nothing unusual about the geology of Nares Strait. The only problem is to obtain sufficient data to correctly apportion the spreading motion of Baffin Bay between Nares Strait, Lancaster and Jones Sounds and other possible places.

May I again congratulate the editors and authors of this symposium on clarifying how to tackle this problem.

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