

'THE EXPANDING EARTH' A Symposium edited by S. W. Carey, University of Tasmania, Department of Geology, Hobart, 1983, 423 pp., \$ 27.50 Australian.

The Expanding Earth, a symposium volume edited by S.W. Carey, is a good and useful book and covers a broad spectrum, bringing together the evidence concerning the concept of an expanding Earth. It contains 54 papers (423 pages) including a few abstracts of the papers presented at the symposium on 'Expanding Earth' held at Hobart, Tasmania, Australia, between 10-14 Feb. 1981. It is shown that many aspects of global geology, especially of the era older than 1000 m.y., are better explained by an earth of smaller size at that time. Direct evidences for a smaller size of the earth during its early history, however, have not been found as yet. Plate tectonic theory is the fashion of the day, but a small minority of geoscientists believe in the expansion model as is evident from the book under review.

The volume is divided into ten chapters. The chapter on Historical Introduction contains three papers by Carey, Brunnschweiler and Vogel and provide an insight into the evolution of concepts of geotectonics from fixism to mobilism.

The chapter on Post-Permian Palaeogeography includes four papers and one abstract. Owen, in his paper on 'Ocean floor spreading evidence of global expansion', argues that reconstructions based on expanding earth model are in better agreement with field data. Dooley and Bailey and Stewart in their papers oppose the expansion hypothesis on account of the volume of oceanic waters. They argue that constant volume of water will cover the entire Earth 0.6 times the present radius, by about 8 km of water in Palaeozoic. Expansion, therefore, requires that a significant part of the ocean on a smaller earth was outgased in the later part of the earth's history. This is a serious problem and expansionists have to find out a satisfactory answer for it. Delayed ocean models in view of Helium data are, however, gaining ground.

In the chapter on Pre-Caledonide Palaeogeography, four papers and three abstracts are included. Burrent, illustrates the palaeomagnetic and biogeographic constraints for the expansion hypothesis. If the full length papers by Embleton *et al*, Glikson and Crook were included, the book's scientific content would have been increased many fold. All the three abstracts present significant data supporting expansion. Kremp's paper on 'Precambrian events indicative of Earth Expansion' is convincing. It is the period between 2.5 - 1.0 b.y. for which expansion is needed most and Kremp has marshalled the palaeontological evidence in support of expansion. He has, however, completely neglected the problem of ocean water, though he assumes a global ocean cover of unknown depth in the early stages of Earth's expansion and evolution.

The chapter on Tethys consists of nine papers among which contributions from Stocklin, Ahmad and Carey are quite interesting. As Carey has mentioned 'Indeed Tethys has become football for stratigraphers to such an extent that some say the term has become multiple in meaning and that it should be dropped'. Ahmad emphatically denies the existence of any oceanic Tethys. Stocklin also agrees that Tethys was an epicontinental *rock*. This chapter is very lucid and informative for students of global tectonics.

The section on Pacific Margins includes five papers. Some of them present sound arguments regarding the great area increase of the Pacific. Davidson has argued

the non-existence of Tethys before early Permian and concludes that Early Permian Earth's radius was not greater than 60% of the present radius.

Subduction is one of the most important aspects of plate tectonics, resulting in hundreds of kilometers of crustal shortening. Hard core expansionists consider diapirism causing orogenesis, whereas the moderate expansionists include compression also along with diapirism to explain the structure of mountains. This section has four papers and two abstracts. The paper by Ćirić is interesting and will be useful especially to those who strongly believe in subduction.

The chapter on Asteroidal Impact involves that the impact mechanism appears to be sufficient to account for many types of expansion related phenomenon. Shields could have expanded his section on decaying universal gravitational constant, because it is fundamental to the expansion concept.

The rate of expansion has been discussed in four papers. Talobre, from the measurements of the duration of terrestrial day, the lunar synodic month duration and the fossil-shell growth rates, calculates the expansion rate to be around 2 cm a year. Blinov arrives at a value of 11 mm/year based on his observations. The paper by Stewart is interesting and informative as it gives a review of the different techniques of estimating rate of expansion.

In the section on Geophysics, Dooley and Runcorn deal with geophysical evidence contradicting expansion. Pfeufer presents the thermal expansion model, while Walzer and Maaz discuss mantle convection which is relevant to both expansion and subduction.

For the tenth chapter, in the contents page, it is given as Solar System and Universe, but the corresponding section on p. 341 is given as Planetology and Cosmology. Ross Taylor negates the expansion hypothesis as no expansion is recorded on Moon, Mercury and Mars since the last 4000 m.y. Tryon also does not find evidence of expansion in cosmology. Two papers by Carey, one on 'Earth Expansion and Null Universe' and the other under convener's review ('The necessity for Earth Expansion') are convincing, but the concept of expansion has to go a long way before it can hope to gain general acceptance.

The book contains abstracts in Russian too and will be helpful to Russian scientists. The get-up of the book is good. The cover page is very attractive and explanatory. The illustrations are excellently drafted and printed. Even though majority of the community of geoscientists may not have faith in expansion, it will be useful for them to read this book as it gives the other point of view in a very clear and lucid style.

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