THE TETHYS PARADOX IN PLATE TECTONICS

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All current plate tectonic models assume for Permo-Triassic time a Tethys Ocean widely gaping from the Mediterranean to the east (e.g., Dietz and Holden, 1970; Smith et al., 1973). This Permo-Triassic Tethys Ocean has been inferred from paleomagnetic evidence assuming an Earth of constant radius, but it is in flagrant contradiction with the total lack of geological evidence for the existence of a Tethys Ocean of that age. The fact is that not a single sample of a demonstrably Permian or Early Triassic oceanic sediment nor of an ophiolitic rock datable radiometrically or paleontologically as Permian or Early Triassic has ever been found by any geologist in any of the Paleo- and Neo-Tethyan suture zones of the Alpine-Himalayan mountain ranges (Stocklin, 1983 and in press).

Ophiolites and associated deep-water sediments are found in what may be a Paleotethys suture in Iran, Afghanistan, the Pamirs, Tibet, Yunnan, Thailand and Malaysia, but wherever these rocks could be dated they have given Late Devonian - Early Carboniferous ages. Permo-Triassic sediments in these zones are post-ophiolitic and include red continental clastics, shallow-water limestones and so-called "flysch" containing coal beds; associated volcanics are subordinate and of a composition from basaltic to rhyolitic but not ophiolitic.

In the Neotethys suture zones of the Irano-Himalayan orogen, Permian and older sediments are entirely missing except for rare limestone blocks that are exotic and, at any rate, not oceanic but of shallow-water origin. Radiometric dating of Neotethyan ophiolites has given ages from Cretaceous to Tertiary without a single exception. Of thousands of paleontological datings made so far in ophiolite/sediment associations, the vast majority falls within a range from Tithonian to Early Tertiary, with those referring to confirmed synsedimentary associations being limited to a range from Cenomanian to Paleocene. Alleged older (Jurassic, Triassic) paleontological ophiolite ages are few in number and all disputable either with respect to the synsedimentary relationship or with respect to the ophiolitic nature of the volcanic components. These few, disputed ophiolite occurrences for which a possible Late Triassic - Jurassic age cannot be entirely dismissed may, at best, indicate incipient rifting in the Early Mesozoic, heralding the opening and spreading of a Neotethys in the Middle-Late Mesozoic. Still, no evidence whatsoever has been found for a Tethys Ocean of Permo-Scythian age; one has to go as far as Mongolia and Mandschuria to find oceanic rocks of that age —and this is no longer the Tethys.

On the other hand, shelf-type epicontinental sediments of Permo-Triassic age are widespread in the Irano-Himalayan ranges, indicating that the Permo-Triassic Tethys was not a wide "ocean" (in the plate-tectonic sense) but a wide epicontinental sea.

The geological evidence against the existence of a Permo-Scythian Tethys Ocean and against any substantial development of an oceanic Neotethys in earlier than Cretaceous time has become too persistent, too conspicuous, too alarming to be disregarded any longer or to be explained away by subduction. Why should subduction have spared substantial amounts of Devonian-Carboniferous and Cretaceous rocks of a Tethys Ocean but not one trace of its Permian and Early Triassic record? It simply points to the non-existence of a Tethys Ocean in Permian -Early Triassic time. It also means that, if no Permo-Scythian Tethys Ocean and at best a Late Triassic incipient Tethys rift was available for subsequent subduction, opening of the Indian Ocean in Jurassic time cannot have been compensated by Tethyan subduction. This calls in question the very fundaments of the plate-tectonic concept and its paleomagnetic premises.

As discussed by Carey (1975), the wide Tethys Ocean of the Permo-Triassic reconstructions is required only if the paleomagnetic data are applied to an Earth of present size. Owen (1976), using paleomagnetic data for the Early Mesozoic, has demonstrated that, without inserting a Tethys Ocean, "... an exact fit of the various continental fragments together to reform Paneaea... is obtained when the value of the Earth's surface curvature is increased to the point at which the diameter of the globe is 80% of its current mean value." Owen's Pangaea, like Wegener's (1929), is undivided by a Tethys Ocean though conceivably transgressed by an epicontinental Tethys Sea such as indicated by the Permian - Early Mesozoic sediments of the Irano-Himalayan ranges.

Carey (1975) has pointed out a number of other, no less alarming paradoxes in current plate-tectonic models which would vanish on an expanding Earth: overshooting paleo-poles and repetition of paleo-equators plotted from different plates; convergence of the northern continents in the Arctic region which itself is extensional; and others.

For these reasons the writer recommends that serious consideration be given to the theory of Earth Expansion (Carey, 1976) as a possible answer to the Tethyan and other paradoxes that are inherent in the plate-tectonic concept.

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