

## CAMBRIAN TRILOBITE FAUNAS FROM INDIA: A MULTIVARIATE AND COMPUTER-GRAPHIC REAPPRAISAL AND ITS PALEOGEOGRAPHIC IMPLICATIONS

HUGHES\*, Nigel C., Queensland Museum, P.O. Box 300, South Brisbane, QLD 4101, Australia; JELL, Peter A., Queensland Museum, P.O. Box 300, South Brisbane, QLD 4101, Australia.

Cambrian trilobite faunas from northern India provide data critical for assessing earliest Phanerozoic paleogeography and for constraining tectonic models of Himalayan evolution. Previous investigations suggest that Indian Middle Cambrian trilobite faunas, collected from basins 500 km apart, are strikingly different. The Kashmir fauna, in the west, shows supposed faunal affinities with northern China, while the Spiti fauna, in the east, was considered of European affinity. This counter-intuitive faunal distribution in adjacent basins might suggest that the area was made up of several micro-continents during Cambrian time. Although frequently neglected, this interpretation has major implications for models of Himalayan mountain building, as most models assume a passive northern margin of India throughout the Phanerozoic.

Original type material from Kashmir and Spiti and fresh collections from intermediate localities in the Zaskar valley have been evaluated using a new statistical/computer-graphic method which removes the effects of tectonic deformation. Results show that the supposed taxonomic distinctness of the Kashmiri and Spiti faunas is largely superficial. Previous lack of appreciation of deformation has led to: 1. over-estimation of the number of taxa present; 2. misidentification of many taxa; 3. spurious correlations with other faunas; 4. inaccurate age estimates. The revised assessment indicates that: 1. approximately 12 species of polymerid trilobites are present in the Middle Cambrian of north India; 2. 3 polymerid trilobite species are common to both Kashmir and Spiti faunas; 3. much of the Spiti fauna is significantly older than the Kashmiri fauna; 4. faunal differences between coeval deposits from the two basins are best explained as biofacies differences related to an offshore proximality trend; 5. species show patterns of developmental flexibility similar to that recently reported in other Cambrian trilobites. The faunas do not suggest that Kashmir and Spiti were part of separate continents during the Cambrian.

The morphology of Middle Cambrian faunas from Kashmir, Zaskar and Spiti suggests that all polymerid species were benthic and share morphotypes characteristic of trilobites from slope environments. Lithologic evidence suggesting that Kashmiri faunas were deeper water than those from Spiti is complimented by the presence in Kashmir of the atheloptic trilobite *Bailiella*, which is characteristic of deeper waters. Faunas from Kashmir, Zaskar and Spiti, which lie within the Tethyan belt of the Indian Himalaya, share closest affinity with those described from north China, north Vietnam and south China. They also show affinity with faunas from Iran. This pattern is consistent with recent paleogeographic reconstructions which place these regions in close proximity and at similar latitudes. Most of the Cambrian within the Tethyan Himalaya is of middle Middle Cambrian age.

The recognition of developmental flexibility as a general characteristic of Cambrian trilobites suggests many groups may be taxonomically over-split. Over-splitting may have led to widespread over-estimation of faunal provinciality during Cambrian times.