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CONODONT BIOSTRATIGRAPHY AND PALEOGEOGRAPHY OF THE TRIASSIC OF THE AUSTRALIAN PLATE AND OF THE ACCRETED TERRANES OF NEW ZEALAND

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After the paucity of Permian conodont faunas recorded in the Australian and New Zealand sectors of Gondwanaland, the Triassic conodont record for insitu Australian marine sediments, and for the accreted terranes of New Zealand is encouraging, both in geographic spread and stratigraphic range. In neither area have conodonts of the early Griesbachian, that is the *Hindeodus parvus* and *Isarcicella* spp. faunas, been recorded, but after that apparent gap scattered (both geographic and stratigraphic), faunas are found from sequences of Dienerian to Rhaetian age.

AUSTRALIA AND THE NORTHERN MARGIN

In the Triassic the northern margin of Gondwanan Pangea opened onto the Meso-Tethys Ocean (Nicoll, 2002). The then continental margin was formed by the Lhasa and West Burma Blocks, parts of the Banda Arc and the New Guinea portion of the Australian Plate. Along what would become the margin of the Australian Plate were a series of cratonic basins, from the Perth Basin in the south, through the Bonaparte Basin to poorly defined Triassic basin structures on islands of the Banda Arc. In terms of the present day Australian Plate, only along the northern margin of present-day New Guinea and some of the islands of the Northern Banda Arc did continental margin shelf areas open directly onto the Meso-Tethys Ocean. Within this setting Triassic sediments were deposited in tectonically controlled basins. Conodonts and other fossils are beginning to allow high resolution correlation of sedimentary sequences and events within and between these basins.

Almost all of the Australian Triassic record is found in sedimentary basin sequences that are now either located offshore or when onshore are buried by younger sediments. For this reason the biostratigraphic record of the Early and Middle Triassic intervals have been only sketchily studied (McTavish, 1973; Nicoll & Foster, 1998). In addition, the sediments of the Middle and Late Triassic in the Perth, Carnarvon and Canning Basins are largely non-marine (Gorter, 1994). In the Perth Basin the Early Triassic is represented by the marine Kockatea Shale. Conodonts from several wells have provided Dienerian to Spathian ages. In the Carnarvon Basin the laterally equivalent Locker Shale ranges in age from Dienerian through Early Anisian, as documented by the presence of *Chiosella timorensis*. The equivalent interval in the Canning Basin in the Early Triassic is represented, in part, by the Blina Shale (onshore) and/or the Locker Shale (offshore). In the Canning Basin these intervals have not been seriously studied for conodonts.

On the outer margins of the Australian Plate, on the Wombat Plateau, Rowley Terrace and Ashmore Platform, only the upper part of the Triassic sequence has been effectively sampled. However, on the Sahul Platform wells have penetrated the interval from Rhaetian to Anisian.

Investigation of the Triassic on the island of Timor has recorded an extensive interval of marine Triassic sedimentation ranging from Dienerian through Rhaetian. The tectonically generated structural complexity of these sediments, related to their early rifting away from the margin of the Australian Plate and their later re-attachment have tended to mask the depositional relationship of the Timor sequences to the equivalent sediments of the Australian margin. Recent sampling of selected intervals is now demonstrating the close faunal similarities of the two areas.

Triassic sediments have yet to be extensively investigated in other islands of the Indonesian Banda Arc and New Guinea (Nicoll, 2002). Thus far only Rhaetian conodont faunas have been identified.

NEW ZEALAND

Unlike the northern margin of the Australian Plate that faced the Tethys Ocean and was subject to progressive rifting of continental blocks, the southeastern margin faced the broad Panthalassa Ocean and was subjected to both inboard small-scale rifting and the accretion of exotic terranes on the outboard margin. All of the known New Zealand Carboniferous, Permian and Triassic conodont faunas are from sequences within these accreted terranes.

The New Zealand Triassic conodont faunas appear to represent three distinctive ages, Early Triassic (Dienerian to Smithian), Middle Triassic (Anisian) and Late Triassic (Carnian to Norian). The ages of the incorporated conodont faunas do not, at least at this stage of investigation, appear to be in any way related to the order of terrane incorporation. The Arrow Rocks locality in the Waipapa Terrane of the North Island contains Induan (Dienerian, *N. dieneri* Zone) and upwards to *N. waageni* Zone (Early Olenekian = Smithian) faunas. The *N. dieneri* Zone (late Induan = Dienerian) fauna includes *Clarkina carinata, Neospathodus cristagalli, N. dieneri*, and *Sweetospathodus kummeli*. The upper fauna of the *N. waageni* Zone (Early Olenekian = Smithian) includes *Neospathodus cristagalli, N. dieneri, N. pakistanensis, N. waageni,* and *Sweetospathodus kummeli*.

The majority of the Triassic conodont faunas known from New Zealand are of Norian Age and have been recovered from various localities within the Torlesse Terrane. The conodonts from the Ruahine Range locality in the Torlesse Terrane Complex of southeastern North Island were all recovered from a single limestone block (Marden et al. 1987). The fauna includes *Paragondolella polygnathiformis* and *Norigondolella navicula*. The age of the Ruahine Range fauna appears to be latest Carnian to earliest Norian.

The conodont faunas of the Torlesse Terrane of the South Island (Jenkins & Jenkins 1971; Silberling et al. 1988) are of Norian age. Jenkins and Jenkins (1971) were the first to report and illustrate the presence of Triassic conodonts from New Zealand. They described two low-diversity faunas, one from the Mount Mason Limestone containing *Norigondolella navicula* (early Norian) and a second from the Okuku Limestone that is of early Late Norian age and contains *Norigondolella steinbergensis*. Silberling et al. (1988) recovered Triassic conodonts from 10 localities. Eight localities, including the Mount Mason and Okuku localities of Jenkins and Jenkins (1971b), were from the Esk Head Subterrane (or Melange) and duplicated the faunas found during the earlier study. Only at one locality, at Studleigh Range, were both *Norigondolella navicula* and *N. steinbergensis* faunas recovered, but from samples (142, 143) at least 10 metres stratigraphically apart.

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