

## Peculiarities of Permian – Triassic palynological records

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A severe biotic crisis occurred on land at the end of the Permian which is reflected not only by a major (micro)floral turnover but also by palynological peculiarities that characterize the Permian-Triassic (P-Tr) pollen and spore records in many parts of the world. Two of them will be discussed in this presentation. The first one is an acme of filamentous organic-walled microfossils assigned to *Reduviasporonites* Wilson 1962, which is the senior synonym of *Chordecysta* Foster 1979 and *Tympanicysta* Balme 1980. Although they have been persistently described from many P-Tr boundary sections, their biological affinity and their ecological role in an end-Permian extinction scenario is still controversially discussed. Based on morphological features they have been interpreted as saprophytic fungal remains that thrived on the mass of dead wood (Visscher et al. 1996, Elsik 1999). But their fungal affinity has been refuted (Foster et al., 2002) because of their organic-geochemical composition and C-isotopic signature. Foster and co-workers, as well as Afonin (2001), favoured an algal origin. Freshwater green algae of the Zygnemataceae are regarded as their nearest living relatives. Because the significance of the organic geochemical data as evidence for either an algal or fungal origin has been questioned (Sephton et al., 2009), the morphology of *Reduviasporonites* has been restudied in a recent paper (Visscher et al., in press). They show a close morphological similarity with resting structures of soil born filamentous fungi. These modern relatives include abundant plant pathogens. In analogy to their role in modern ecosystems they may have played a significant role as a cause for the widespread demise of the arboreal vegetation during the end-Permian biotic crisis.

Another peculiarity of end-Permian palynological records is the increased abundance of abnormal gymnosperm pollen (Foster and Afonin, 2005) and lycophyte spore tetrads (Visscher et al., 2004). Both features have been interpreted as evidence for environmental mutagenesis in response to enhanced levels of UV-B radiation.

The age and palaeoenvironmental conditions spanning the Permian/Triassic boundary in the northern onshore Perth Basin by using biomarker distributions and stable isotopes (C, H)

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The Perth Basin petroleum system has been intermittently explored for the last few decades, resulting in the production of gas and oil from several onshore fields. The effective source rock for petroleum in the Perth Basin is the marine Kockatea Shale, with the hydrogen-richest interval being the Sapropelic Unit of the Hovea Member. The Perth Basin in southwest Western Australia (WA) is a deep, north to south trending basin. The Perth Basin sediments comprise of rocks of Permian–Early Cretaceous in age. The current perception is that the area is gas prone and has been challenged with the recent discovery of the near-shore Cliff Head oil field. The Dongara gas field in the onshore Perth Basin contains more than half the oil and gas reserves. The Perth Basin sediments used in this study are from the Senecio-1 core which is located approximately 15.5 km from the north of Dongara. Stable carbon and hydrogen isotopic composition of biomarkers measured by compound specific isotopic analysis (CSIA) has been shown to be an effective tool for establishing biogeochemical changes in the Early Triassic. In the present study bulk geochemical, biomarker and CSIA of biomarkers are used to restrain the age and palaeoenvironmental conditions spanning the Triassic in the northern onshore Perth Basin and to compare these results with the Hovea-3 drill core ‘type-section’ (Grice et al., 2005a). For this purpose 31 samples from the Senecio-1 cored at 1 m spacing were selected. The ages of the samples have been determined by conodont biostratigraphy (Metcalfe, these proceedings). Rock-Eval & TOC analyses have been performed to identify the type and maturity of organic matter and to evaluate the petroleum potential of these samples. The samples were analysed following the methodology of Grice et al. (2005b). Each sample was ground to a fine powder and extracted using an Accelerated solvent extractor. The extracts were separated into 6 fractions by liquid chromatography.

Saturate and aromatic hydrocarbon fractions were characterised by GC-MS. The saturated hydrocarbon fractions were separated from branched and cyclic hydrocarbons by treating with 5A molecular sieves and CSIA of biomarkers was performed for these fractions. Bulk stable isotopic compositions were measured on the kerogens isolated from the extracted powders. The data is consistent with Hovea-3 for both Rock-Eval and kerogen type.  $\delta^{13}\text{C}$  of the bulk organic matter is consistent with land plant derived material and phytoplanktonic, the change in stable isotopes is not as abrupt as shown in Hovea-3.