PÁLFY

PERMIAN-TRIASSIC ECOSYSTEMS
IGCP572: Restoration of marine ecosystems following the Permian-Triassic mass extinction
LESSONS FOR THE PRESENT

IGCP 572 CLOSING CONFERENCE

May 30 – June 7, 2012
Eger, Hungary

Eszterházy Károly College
Eger, Leányka Street 6, Building "D"

Abstract volume
&
Field Guide – Bükk Mountains

COMPARATIVE ANALYSIS OF PERMIAN–TRIASSIC AND TRIASSIC–JURASSIC BOUNDARY SECTIONS IN HUNGARY

János HAAS[1] and József PÁLFY[2, 3]

[1] *MTA–ELTE Geological, Geophysical and Space Science Research Group, Budapest, Hungary. (haas@caesar.elte.hu)*
[2] *Department of Physical and Applied Geology, Eötvös University, Budapest,Hungary*
[3] *MTA–MTM–ELTE Research Group for Paleontology, Budapest,Hungary palfy@nhmus.hu*

The stratigraphic record in Hungary includes sections that record mass extinction events, which have been in the focus of recent studies, in conjunction with international research projects. Both the Permian-Triassic (P-T) and the Triassic-Jurassic (T-J) boundary are well represented in Hungary and have been subjected to multidisciplinary investigation, largely by the same research team, using the same approach and methodology. Thus the major extinction events at the beginning and the end of the Triassic period are directly comparable using the Hungarian stratigraphic sections, in order to reconstruct the changes and sequence of events, discuss similarities and differences between the end-Permian and end-Triassic events, and attempt to infer their causes.

The studied marine strata were deposited at the Tethyan margin, on shallow to moderately deep parts of a ramp at the Permian-Triassic transition (Bálvány section, Bükk Mts.), and in a partly restricted basin which became gradually more open at the Triassic-Jurassic transition (Csővár section, Transdanubian Range Unit). It is crucial to distinguish between local effects, Tethys-wide and global phenomena controlling the observed sedimentary and paleobiological patterns. Therefore the Hungarian sections need to be further compared with other well-studied boundary sections worldwide.

Marine P-T boundary sections are known in the Bükk Mountains in northern Hungary. The outer ramp–shallow basin facies of the Bükk Mountains represents the deeper offshore zone of the Tethys shelf. Based on our detailed studies, especially in the Bálvány North section, the series of changes in the P–T boundary interval can be summarised as follows:

- onset of $\delta^{13}C$ negative shift in the latest Permian (*praeparvus* Zone);
- significant reduction of amount of skeletal detritus;
- significant decrease in the carbonate content, appearance of amphibolite rock fragments, large amount of pyrite;
- last occurrence of the Permian bivalves and brachiopods, significant reduction of amount of skeletal detritus, negative $\delta^{13}C$ peak;
- appearance of microbial carbonates, stabilisation of $\delta^{13}C$ values at about -1‰ in the earliest Triassic (*parvus* Zone).

A continuous marine T-J section is exposed near Csővár, at the northeasternmost end of the Transdanubian Range Unit. Slope, toe-of-slope and basinal facies of an intraplatform basin, related to the extensive late Triassic Dachstein carbonate platform, exhibit the following changes in the T-J boundary interval:

-stepwise disappearance of conodont species and last occurrence of Triassic choristoceratid ammonoids;
-major reduction in the amount of bioclasts and skeletal detritus;
-last occurrence of Triassic foraminifera;

-major negative $\delta^{13}C$ excursion;
-reappearance of resedimented biodetritus.

Locally, both the P-T and T-J transitions share gross similarities of the prominent negative carbon isotope anomaly and the stepwise biotic decline, observed in the micro- and macrofossil record and the biogenic sedimentary components. Leading hypotheses for both the P-T and T-J extinction and environmental change invoke a cascade of events triggered by volcanism of large igneous provinces (LIPs), i.e. the Siberian Trap and the Central Atlantic Magmatic Province. Similarities thus largely reflect the common driving force, LIP volcanism. Differences are partly explained by the local sedimentary environment, e.g. the deeper setting of the Csővár basin, and partly related to the greater magnitude of the P-T event. An obvious difference is the presence of microbial carbonates and the significantly longer recovery after the P-T event.