Geophysical Research Abstracts
Vol. 14, EGU2012-12693-1, 2012
EGU General Assembly 2012

Devonian Terrestrial Revolution: the palaeoenvironment of the oldest known tetrapod tracks, Zachełmie Quarry, Poland

G. Niedźwiedzki (1,2)

(1) Subdepartment of Evolution and Development, Department of Organismal Biology, Uppsala University, Norbyvägen 18A, 752 36 Uppsala, Sweden, (2) Faculty of Biology, University of Warsaw, Banacha 2, 02-079 Warsaw, Poland

Numerous trackways and isolated prints with digit impressions, which are similar to the foot anatomy of early tetrapods such as Ichthyostega, were found on the three dolomite bed-surfaces in the lower part of the Wojciechowice Formation exposed in the Zachełmie Quarry in the Holy Cross Mountains (south-central Poland), (Niedźwiedzki et al., 2010). The age of the tetrapod track-bearing strata is well-constrained, but the detailed sedimentology of the lower section with tetrapod ichnites is still under study. The Wojciechowice Formation represent one of the first carbonate stages of a transgressive succession that begins with Early Devonian continental to marginal marine clastics and culminates in the development of a Givetian coral-stromatoporoid carbonate platform. The tetrapod track-bearing complex is composed of grey to reddish, thin- to medium-bedded dolomitic shales and marly dolomite mudstones. These deposits from the tetrapod track-bearing horizon lack definitive marine body fossils, and may have formed in a marginal marine environment, e.g. around a coastal lagoon. Mudcracks, columnar peds, root traces, and microbially induced sedimentary structures were found in three distinct pedotypes of very weakly to weakly developed paleosols (Retallack, 2011). Conodonts of the costatus zone (mid-Eifelian) were found 20 m above the uppermost surface with tetrapod tracks in limestones of the upper Wojciechowice Formation, which contain also brachiopod and crinoidal debris. The overlying Kowala Formation is a marine coral limestone and dolostone. The parts of profile with tetrapod ichnites and invertebrate and conodont fossils contain also records of invertebrate traces. Seven ichnotaxa are distributed among four recognized ichnoassemblages. The recognized ichnocoenoses are typical for the shallow-marine (Cruziana ichnofacies) and land-water transitional (Skolithos/Psilonichnus ichnofacies) carbonate depositional environments. The ichnocoenoses are dominated by trace fossils produced by arthropods (probably crustaceans), a group that can create large and distinctive burrows. The palaeoecological information from the Zachełmie section has direct bearing on the interpretation of environmental aspects of tetrapod emergence and terrestrialization. It should be fully integrated with data from other Devonian tetrapod tracksites.

Niedźwiedzki, G., Szrek P., Narkiewicz K., Narkiewicz M. and Ahlberg P.E. 2010. Tetrapod trackways from the early Middle Devonian period of Poland. Nature, 463: 43-48.

Retallack, G.J. 2011. Woodland Hypothesis for Devonian Tetrapod Evolution. The Journal of Geology, 119, 3: 235-258