Ichnofabrics of the Cenomanian-Turonian Boundary Event in the Betic Cordillera, southern Spain

Alfred UCHMAN[1] & Francisco J. RODRÍGUEZ-TOVAR[2]

[1]Jagiellonian University, Institute of Geological Sciences, Oleandry Str. 2a, PL-30-063 Kraków, Poland; [2]Departamento de Estratigrafía y Paleontología, Facultad de Ciencias, Universidad de Granada, Avd. Fuente nueva s/n, 18002 Granada, Spain; alfred.uchman@uj.edu.pl; fjrtovar@ugr.es

Dark and lighter calcareous and non-calcareous sediments of the Oceanic Anoxic Event at the Cenomanian-Turonian boundary interval (OAE-2) from the Betic Cordillera, southern Spain, display different degree of bioturbation. Their ichnofabrics contain trace fossils *Chondrites* isp., *Palaeophycus heberti*, *Planolites* isp., *Thalassinoides* isp., *Trichichnus linearis*, *Zoophycos* isp., and bioturbational structures (Rodríguez-Tovar et al., in press). Analysis of the ichnofabrics and trace fossil features (diversity, abundance) allowed reconstruction of oxygenation changes. Anoxic sediments display primary lamination and dark colour and commonly are poorly calcareous or noncalcareous. Dysoxic and oxic sediments are lighter and totally bioturbated. Before the OAE-2 oxygenation of sediments was generally good, but it was punctuated by short anoxic sub-events. During the OAE-2, several longer anoxic intervals were recurrently interrupted by shorter dysaerobic and oxic periods. After the OAE-2 oxygenation improved and almost all trace fossils known before OAE-2 occurred again. Nevertheless, oxygenation fluctuated and dropped a few times to anoxia. Generally, the short oxygenation changes reveal a periodicity, which maybe corresponds to the Milankovitch cyclicity.

Two sections (Hedionda and El Chorro, Malaga Province, South Spain) of the Cenomanian–Turonian boundary interval, belonging to the Penibetic domain in the southern Iberian continental palaeomargin were correlated and compared to evaluate changes in palaeoceanographic conditions (Rodríguez-Tovar et al., 2009). The sections originally were located about 70 km apart. The oxic/anoxic sub-events display a tendency to expansion from the more distal section (Hedionda) towards the proximal one (El Chorro). The anoxia spread out from the open sea, probably from slope upwellings. Higher diversity and abundance of trace fossils in comparatively distal position during the pre- and post-event intervals can be caused by a higher abundance of food available for tracemakers. Shape of the correlation bands of the OAE-2 event suggests that the event started earlier by about a few tens of thousands years in the most distal areas than in proximal, slightly higher bottom settings. The proximal section is also thicker pointing to distinctly higher sedimentation rate.

Ichnological analysis of the Cenomanian-Turonian boundary interval in the deep-sea turbiditic sediments of the Polish Carpathians (Magura Unit) revealed similar features in the pre-event and event part of the studied section (Barnasiówka). However, the post-event segment displays very well-oxygenated, oligotrophic, non-calcareous variegated shales (Uchman et al., 2008).

Rodríguez-Tovar, F.J., Uchman, A. & Martín-Algarra, A. In press. Oceanic Anoxic Event at the Cenomanian–Turonian boundary interval (OAE-2): ichnological approach from the Betic Cordillera, southern Spain. Lethaia.

Rodríguez-Tovar, F.J., Uchman, A., Martín-Algarra, A. & O'Dogherty, L. (2009): Nutrient spatial variation during intrabasinal upwelling at the Cenomanian–Turonian oceanic anoxic event in the westernmost Tethys: An ichnological and facies approach. Sedimentary Geology, 215: 83-93.

Uchman, A., Bąk, K. & Rodríguez-Tovar, F.J. (2008): Ichnological record of deep-sea palaeoenvironmental changes around the Oceanic Anoxic Event 2 (Cenomanian–Turonian boundary): An example from the Barnasiówka section, Polish Outer Carpathians. Palaeogeography, Palaeoclimatology, Palaeoecology, 262: 61-71.