

Original article

Brachiopods and other fossils from the Permo–Triassic boundary beds of the Antalya Nappes (SW Taurus, Turkey)

Brachiopodes et autres fossiles de la limite Permien Trias dans les Nappes d'Antalya (Taurus, Sud-Ouest de la Turquie)

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Abstract

An uppermost Permian–Lower Triassic biota of brachiopods, conodonts, algae and foraminifers from the Pamucak and Kokarkuyu formations at Çürük Dağ (Antalya, Turkey) is here described. The brachiopods belong to two different assemblages: a lower assemblage, early Wuchiapingian in age, with *Spinomarginifera* cf. *S. helica*, *Spinomarginifera* cf. *S. iranica*, *Alatorthotetina* sp. ind., *Orthothetina* sp. ind., *Ombonia antalyensis* nov. sp. and few specimens of Pennospiriferinoidea; an upper assemblage, Changhsingian in age, comprising *S. cf. S. iranica*, *Spinomarginifera* cf. *S. spinosocostata*, *Spinomarginifera* sp. ind. and *Orthothetina* sp. ind., characteristic taxa of the low diversity survival brachiopod faunas of latest Permian age (Survival Fauna 1). The occurrence of the conodont *Hindeodus* cf. *praeparvus* above the brachiopod fauna confirms its Changhsingian age. The oolitic grainstones at the top of the Pamucak Formation contain *Permocalculus* sp., *Macroporella* cf. *apachena*, species of *Hemigordius* and Palaeozoic Lagenida. Coarse calcite fibrous cements pervade the oo-bioclastic grainstones, suggesting early marine cementation. The base of the Kokarkuyu Formation is characterized by the disaster forms *Earlandia amplimuralis* and "*Cornuspira*" *mahajeri*, gastropods and ostracods. The conodont *Isarcicella lobata* has been recovered 31 m above the base of the Kokarkuyu Formation, indicating the occurrence of the second Triassic conodont zone above the *parvus* biozone and below the *staeschei* biozone. The faunal content at the transition of the Pamucak and Kokarkuyu formations records the biotic survival in the aftermath of the end-Permian extinction. Facies evolution from lower energy inner platform wackestones and packstones to higher energy open platform oolitic grainstones indicates a transgression at the top of the Pamucak Formation, which continues into the Lower Triassic Kokarkuyu Formation.

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Résumé

Une faune et flore de brachiopodes, conodontes, algues et foraminifères, datée du Permien terminal est ici décrite. Elle provient des formations de Pamucak et Kokarkuyu du Çürük Dağ (Nappes Antalya, Turquie). Les brachiopodes appartiennent à deux assemblages différents : un assemblage inférieur, d'âge Wuchiapingien, avec *Spinomarginifera* cf. *S. helica*, *Spinomarginifera* cf. *S. iranica*, *Alatorthotetina* sp. ind., *Orthothetina* sp. ind., *Ombonia antalyensis* nov. sp. et quelques spécimens de Pennospiriferinoidea ; un assemblage supérieur, d'âge Changhsingien, comprenant *S. cf. S. iranica*, *Spinomarginifera* cf. *S. spinosocostata*, *Spinomarginifera* sp. ind. et *Orthothetina* sp. ind., taxons caractéristiques des faunes survivantes faiblement diversifiées du Permien terminal (Survival Fauna 1). La présence du conodonte *Hindeodus* cf. *praeparvus* au dessus de la faune de brachiopodes confirme l'âge Changhsingien de la partie supérieure de la Formation de Pamucak. Les grainstones à oolithes du sommet de la Formation de Pamucak contiennent *Permocalculus* sp., *Macroporella* cf. *apachena*, *Hemigordius* sp. et

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paléozoïque *Lagenida*. La base de la Formation de Kokarkuyu renferme des « formes désastres » *Earlandia amplimuralis*, « *Cornuspira* » *mahajeri*, des gastéropodes et des ostracodes. Le conodonte *Isarcicella lobata* a été mis en évidence 31 m au dessus de la base de la Formation de Kokarkuyu, caractérisant la seconde zone à conodonte du Trias au dessus de la biozone à *parvus* et en dessous de la biozone à *staeschei*. Le contenu faunistique à la transition des formations de Pamucak et de Kokarkuyu montre l'absence de hiatus entre les deux formations et met en évidence la continuité de sédimentation à la limite Permien–Trias pendant une transgression globale. Il représente aussi la faune survivant après la crise du Permien supérieur.

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Keywords: Permo–Triassic boundary; Brachiopods; Conodonts; Foraminifers; Survival faunas; Disaster taxa; New species

Mots clés : Limite Permo–Trias ; Brachiopodes ; Conodontes ; Foraminifères ; Faunes survivantes ; « Formes désastres » ; Espèce nouvelle

1. Introduction

The Permian has been the theatre of major global changes concerning the geodynamics, the climate, the seawater/atmosphere geochemistry and the biota itself. In this changing world, the biotic response was dramatic, culminating at the end of the period with the severest of the big five mass extinctions also

known as the “Palaeozoic nemesis”, leading to the extinction of 75–96% of the species and to the lowest post-Ordovician biodiversity levels of the Phanerozoic (Hallam and Wignall, 1997).

Many processes have been suggested to explain the end-Permian mass extinction, including changes of sea level (regression), climate changes (global cooling or global

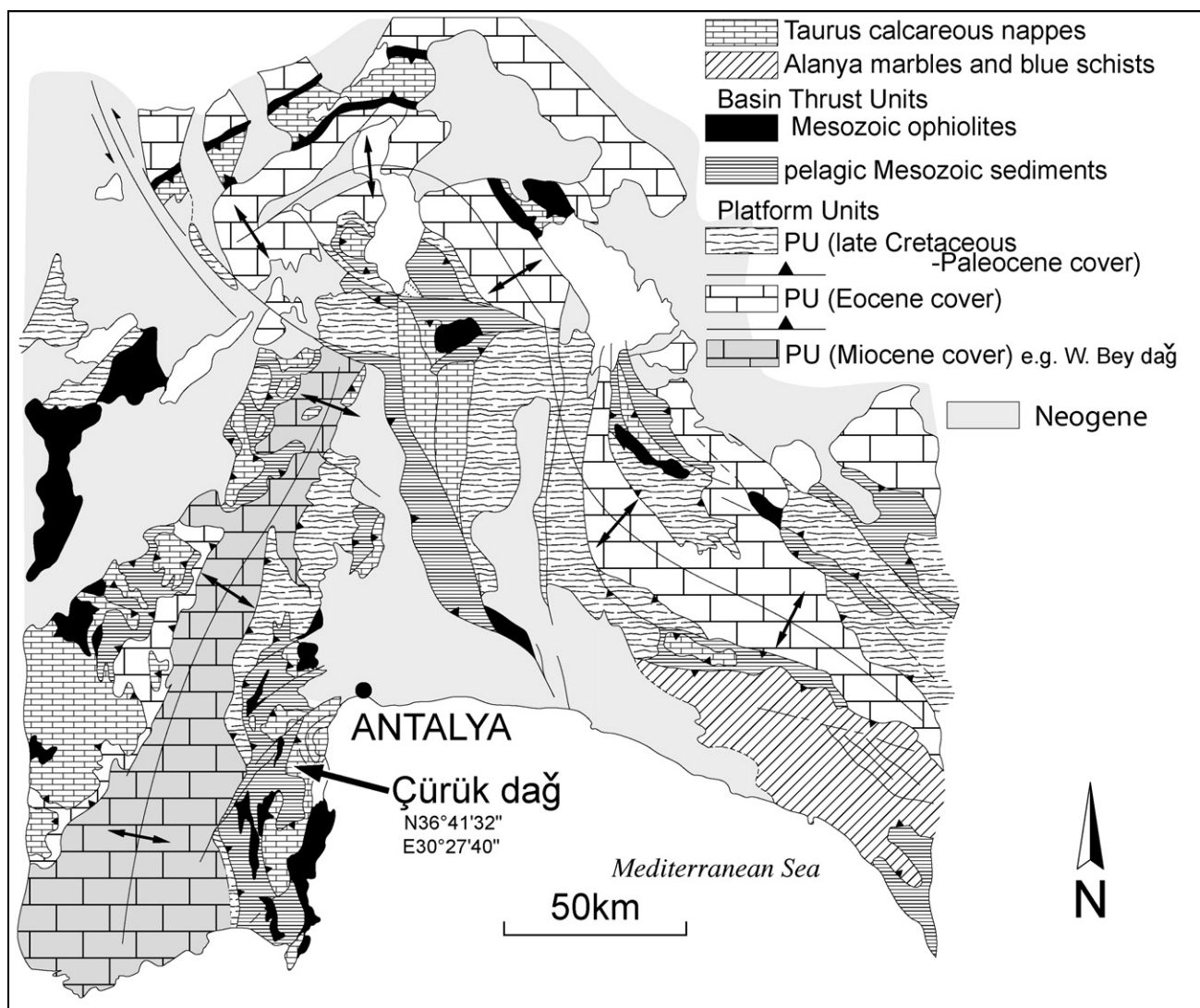


Fig. 1. Geographical and geological setting of the studied sections (modified from Marcoux et al., 1989).

Fig. 1. Situation géographique et géologique des coupes étudiées (modifié d'après Marcoux et al., 1989).

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