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Calcimicrobial cap rocks from the basal Triassic units: western
Taurus occurrences (SW Turkey)

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Abstract

A post-extinction calcimicrobial cap rock occurs above the giant Permian skeletal carbonate platform exposed in the western Taurus Mountains (southern Turkey). It was formed during the main step of a very rapid and large-scale platform flooding (Earliest Triassic) and has been found also in other Tethyan localities. This calcimicrobial cap rock, 20 to 40 m thick, consists of thrombolitic and stromatolitic build-ups at the base and most oolitic grainstone in the upper part. It was terminated by a sudden input of fine terrigenous sediments. The domal, columnar and conical stromatolites are ‘anachronistic’ deposits as are the abundant botryoidal and fanning aragonite crystal pseudomorphs. This again shows the uniqueness of the Earliest Triassic period and indicates a delayed biotic recovery. *To cite this article: A. Baud et al., C. R. Palevol 4 (2005).*

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Résumé

Un chapeau calcimicrobien dans les unités basales du Trias : occurrences dans le Taurus occidental (Turquie du Sud-Ouest). Un chapeau calcimicrobien post-extinction recouvre la plate-forme carbonatée permienne affleurant dans le Taurus occidental (Turquie méridionale) ; il a été reconnu dans d’autres régions téthysiennes. La croissance de ce chapeau s’effectue durant la phase d’inondation principale du Trias basal. D’une épaisseur de 20 à 40 m, ce chapeau est constitué d’une interdigitation de constructions thrombolitiques et de stromatolites, en sa partie inférieure, et principalement de calcarénites oolitiques, au-dessus. Il se termine abruptement avec l’arrivée d’un détritisme terrigène fin. Avec des constructions thrombolitiques et de stromatolites variés ainsi que des ciments aragonitiques abondants, ce dépôt microbien est considéré comme anachronique. Cet apparent retour dans le passé de la sédimentation biogénique montre une des particularités singulières de la période du Trias précoce. Elle est ici le signe d’une radiation retardée. *Pour citer cet article : A. Baud et al., C. R. Palevol 4 (2005).*

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1. Introduction

After the end-Permian mass extinction, primitive groups of microbial communities emerged from stressed palaeoenvironments to recolonise the normal marine area of the Tethys as they do along the western Pantalassa margin [41]. The prolific Upper Palaeozoic skeletal carbonate factory was abruptly replaced by a non-skeletal carbonate factory [9].

During the main step of the very rapid and large-scale end Permian-basal Triassic flooding of the giant Permian carbonate platforms of western and central Tethys [12], we note in different areas (southern Alps, Taurus, Turkey, southern Armenia, eastern Elburz, Iran, Central Iran and northern Oman) the growth of domal stromatolites, thrombolites and/or microbial mats [11].

Previous studies have documented the widespread occurrence of microbialites following the end-Permian mass extinction in eastern Tethys from the basal Triassic of China [15,24–27] and also from Iran [19,20]. Here new data are presented, built on previous studies of the Lower Triassic of western and central Tethys [3,37] as well as earlier microbialite studies [9].

As shown by one of us [37], thrombolites and stromatolites associated with thrombolites show strong carbon isotopic differentiation between their different fabrics. The relationship between the very important extension of these microbial structures in the Lower Triassic deposits [6] and the large carbon isotopic fluctuations throughout this period [34,37] are under study.

Concerning nomenclature, we are following the definitions of microbialites presented by Shapiro [42], who recognized different fabrics (mega-, macro-, meso-, and microstructural). The mesostructure category described internal textures of macrostructural elements that are visible in the field. From the three most common groups of microbialite, two are described here: laminated mesostructure (stromatolites) and clotted mesostructure (thrombolites). For the thrombolites, we found in the studied area two categories of Riding [38]:

- (1) calcified microbial thrombolites;
- (2) tufa-like build-ups.

2. Geological and stratigraphical settings (Figs. 1,2)

Part of the giant carbonate platform crops out in the western Taurus range (southern Turkey) within different thrust units of the upper Antalya Nappes [29] (Fig. 1). The Permian shallow carbonate limestones belong to the Pamucak Formation and the Triassic calcimicrobial rocks to the Lower Kokarkuyu Formation. To the east, in the Ala dag Nappes, Permian sediments belong to the Çekiç dag Formation and the Triassic one to the Gevne Formation [33,37].

One of the best exposure is at the Çürük dag locality at which a 650-m thick section of shallow water carbonates (Middle to Upper Permian–Lower Triassic) is situated at about 15 km northwest of Kemer [8–11,30,31,37] (Figs. 2,3,5). In this section, the Pamucak Formation is represented by a thick (400 to 600 m) cyclic succession of inner to outer platform facies (Guadalupian to Lopingian). The upper part of the formation is made up of black nodular limestones locally with chert (Changhsingian in age). These limestones are rich in calcareous algae (Dasycladacea) and in small foraminifera (mainly *Milliolidae*), with intervals containing brachiopods, echinoderms and crinoids. The microfacies consists of bioclastic wackestones deposited under low energy (algal biomicrites, Fig. 3, microfacies 4). Upward, the facies and the microfacies change abruptly (seeming paraconformity) into high-energy grainstones, then into oolitic grainstones (Fig. 3, microfacies 3), with echinoderms, bivalves and foraminifera of Changhsingian age. The top of the Pamucak Formation shows a strong diagenetic recrystallisation interpreted to have been formed in close proximity to a sub-aerial surface. The lower Kokarkuyu Formation, that is the calcimicrobial cap rock, consists of about 40 m of microbial and oolitic limestones dated by conodonts of the *isarcica* zone (Early Induan, basal Triassic).

Approximately 10 km to the northeast of the Çürük dag locality is the Kopuk dag section (Figs. 1,2,5). The calcimicrobial cap rock that overlies the Late Permian oolitic grainstone is about 42 m thick [37].

About 100 km to the east, near Alanya, a similar but thinner (20 m) calcimicrobial cap rock exists in the

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