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# Discovery of Purbeckian-type ostracod fauna and charophyte flora across the Jurassic–Cretaceous boundary in the Middle Atlas of Morocco (NW Africa): Biostratigraphic and biogeographic implications

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## Abstract

Micropalaeontological investigations of the red beds called "Aït Bazza Formation", from the Marmoucha syncline in the eastern part of the folded Middle Atlas of Morocco, yielded a particular Purbeckian-type ostracod fauna and charophyte flora of high biostratigraphic and biogeographic interest.

The charophyte assemblage, precisely recognized at the upper part of the studied series, is mainly dominated by the clavatoracean species *Globator maillardii praecursor*, *Globator maillardii maillardii*, *Globator maillardii protoincrassatus*, *Dictyoclavator fieri*, *Nodosoclavator bradleyi*, *Clavator reidii pseudoglobatoroides*, and *Clavator grovesii grovesii*, associated with the porocharacean species *Porochara kimmeridgensis*, and *Feistiella bijuescensis*, as well as the characean species *Mesochara harrisii*. This assemblage facilitates reliable correlation with the latest Tithonian–early middle Berriasian European charophyte *Globator maillardii maillardii* biozone of Riveline et al. (1996). This chronostratigraphic constraint perfectly coincides with the data provided by the associated nonmarine ostracod assemblage, consisting of the species *Fabanella boloniensis*, *Limnocythere* sp., *Timiriasevia punctata*, *Mantelliana purbeckensis*, *Scapriculocypris trapezoides*, *Theriosynoecum forbesi*, *Alicenula leguminella*, *Damonella ellipsoidea*, *Cypridea dunkeri dunkeri*, *Cypridea tumescens praecursor*, *Cypridea coelnothi*, *Cypridea* aff. *delicatula*, and *Cypridea tuberculata longtonensis*, characterizing the lower part of the *Theriosynoecum forbesi* Zone, and the *Cypridea dunkeri* and *Cypridea granulosa* subzones of Horne (1995).

From the biogeographical point of view, these are the richest and most diverse Purbeckian-type ostracod and charophyte assemblages reported for first time from Gondwana, precisely at the Moroccan margin of the southwestern Tethys. This particular non-marine fossiliferous hotspot from Gondwana shows strong affinities to coeval faunas and floras previously described from Laurasia, precisely from the northern (France, Spain, Switzerland and Germany) and western (Romania) margins of the Tethys. Consequently, our discovery gives further solid argument confirming an intensive biological exchange between southern and northern Tethyan margins across the Jurassic–Cretaceous boundary.

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