

'Disasteroid' echinoids from Lower Cretaceous offshore deposits of the Dolomites (Southern Alps, Italy)

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Echinoids are common members of the macro-benthos in all marine settings ranging from the intertidal to abyssal depth. Despite their high fossilization potential echinoids from off-shore settings are rarely preserved in the fossil record. Here we present an echinoid fauna from Lower Cretaceous deposits of the Dolomites, which represent a unique window into deeper-water echinoid assemblages of that period. While echinoids are generally very rare in Lower Cretaceous strata of the Alpine region, they are common in the Upper Hauterivian to Lower Barremian Puez Limestone Member of the Puez Formation. Bed-by-bed collecting resulted in more than 200 echinoid specimens distributed all over the lower part of the section. The lowest records are from the *Balearites balearis*-Zone (*Binelliceras binelli*-Subzone), the highest records from the *Gerhardtia sartousiana*-Zone (*Gerhardtia sartousiana*-Subzone) right below the hardground of the widespread Mediterranean *Halimedes*-horizon. Preservation of the specimens is generally very poor due to strong compaction of the fine sediments (nannoconid mudstones), resulting in deformation of the thin-walled coronas. The fauna consists exclusively of basal crown-group atelostomate echinoids ('disasteroids'), including two tithoniids (*Tetraromania* and *Corthya*), as well as two highly modified 'collyritid' taxa which may represent new genera. Members of these groups represent a connecting link between Jurassic early irregular echinoids and modern 'heart urchins'. The Puez echinoid fauna is of special interest because it contains taxa close to the divergence between holasteroids and spatangoids, two major groups of extant irregular echinoids. The assemblage derives from hemi-pelagic deposits and is very unlike in composition to most coeval echinoid faunas reported to date, which usually occur in platform settings. In Lower Cretaceous hemi-pelagic deposits 'disasteroids' might have exploited a similar niche as pourtalesiids do in extant deep-water environments. During the Upper Cretaceous they were replaced by holasteroids, who migrated into deep-water settings after having evolved in shallow-water environments.

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Digitale Literatur/Digital Literature

Zeitschrift/Journal: [Berichte der Geologischen Bundesanstalt](#)

Jahr/Year: 2012

Band/Volume: [94](#)

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Artikel/Article: ['Disasteroid' echinoids from Lower Cretaceous offshore deposits of the Dolomites \(Southern Alps, Italy\). 14](#)