



## Late Cretaceous phymosomatids and the true identity of *Cidarites granulosis* Goldfuss, 1829 (Echinoidea, Phymosomatoida)

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### Abstract

A revision of Late Cretaceous species of the common regular echinoid genus *Phymosoma* Haime in d'Archiac & Haime, 1853 has revealed that *Cidarites granulosis* Goldfuss, 1829 has generally been misinterpreted in the literature. The type specimen of this species is undoubtedly conspecific with material from the lower Maastrichtian of Rügen, northeast Germany. What authors have referred to as *Phymosoma granulosis* in northern temperate (boreal) regions of western Europe and in the Middle East in fact represents an undescribed form which we here name *Phymosoma ravni* sp. nov., which differs from *Cidarites granulosis* in having better-developed biserial pore zones adapically, proportionally larger mamelons on primary tubercles, a flush peristome, and stout, non-faceted primary spines. The proper placement of *Cidarites granulosis* within the family Phymosomatidae Pomel, 1883 is ambiguous; it appears to be most closely related to *Phymosoma*.

**Key words:** Upper Cretaceous, Echinoidea, Phymosomatidae, systematics, new species, palaeogeography

### Introduction

The genus *Phymosoma* ranks amongst the commoner regular echinoids in the Upper Cretaceous chalks of Europe and central Asia. Although its representatives have figured prominently in recent monographic studies, such as those by Smith & Wright (1996), Jagt (2000) and Smith & Jeffery (2000), a number of taxonomic problems related to the true identity of certain common species of *Phymosoma* remain. Such drawbacks reduce the potential utility of this taxon for biostratigraphy and correlation, which is particularly true of one of the most widely-cited Late Cretaceous species within northern Europe, *Cidarites granulosis* Goldfuss, 1829, also known as *Phymosoma granulosis*.

Goldfuss (1829: 122) described his new taxon, *Cidarites granulosis*, as follows (translated from German), 'A flattened-hemispheric test with at least 10 large tubercles in a row, broad bands of granules between these rows and a strongly invaginated peristome'. Unfortunately, this description is so brief and generalised as to make it insufficient to delineate any phymosomatoid species. Furthermore, Goldfuss established his new form on syntypes of widely differing age, noting that *C. granulosis* occurred in Cretaceous strata at Aachen and at Maastricht (both of undoubted Maastrichtian date) and in marls at Essen ('Mergelrand bei Essen an der Ruhr') which are of Cenomanian age. Tracing the original material on which Goldfuss based his form has proved problematic. His original illustration (Goldfuss 1829: pl. 40, fig. 7) depicts the oral side and an ambital aspect of a single specimen, which in both views appears to be complete. However, the Goldfuss Collection at Bonn comprises but a single specimen under this name (RFWUIP 1335; see Fig. 2A–D), allegedly from Maastricht, but this preserves only half