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# First Chambered Hexactinellid Sponge from the Upper Triassic Dachstein Reef Limestone (Hoher Göll, Northern Calcareous Alps)

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3 Text-Figures

*Österreichische Karte 1:50.000*
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*Hexactinellida*
*Hoher Göll*
*Dachstein*
*Sponges*
*Triassic*
*Alps*
*Reef*

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## Erster gekammerter hexactinellider Schwamm aus dem obertriassischen Dachstein-Riffkalk (Hoher Göll, Nördliche Kalkalpen)

### Zusammenfassung

Coralline Schwämme sind wichtige Riffbildner der obertriassischen (Nor–Rhät) Dachstein-Riffe in den Nördlichen Kalkalpen. Hexactinellide Schwämme waren aus diesen Riffen bis jetzt nicht bekannt. In dieser Arbeit wird der erste gekammerte hexactinellide Schwamm – *Casearia alpina* nov. sp. – aus den Dachstein-Riffkalken des Hohen Göll in den Nördlichen Kalkalpen beschrieben.

### Abstract

Coralline sponges are important reef builders of Upper Triassic (Norian–Rhaetian) reefs, the Dachstein reefs in Northern Calcareous Alps. Hexactinellid sponges on the other hand have not been described from the Dachstein limestones so far. In this paper the first chambered hexactinellid sponge – *Casearia alpina* nov. sp. – is described from the Dachstein reef limestone of the Hohe Göll, Northern Calcareous Alps.

## Introduction

The polyphyletic group of "Sphinctozoa" or chambered sponges, occurring from the Cambrian to Recent, are the most abundant sponges in Late Paleozoic and Triassic reefs and shallow water limestones. The majority of chambered sponges are hypercalcified types and most of them probably belong to the Demospongia (Senowbari-Daryan, 1990; Senowbari-Daryan & Garcia Bellido, 2002). Heteractinid, calcispongid and hexactinellid chambered sponges are very rare and known only by few genera (Senowbari-Daryan, 1990; Pickett, 2002; Senowbari-Daryan, B. & Garcia-Bellido, D.C., 2002; Senowbari-Daryan & Rigby, in press).

The first chambered hexactinellid sponge has been described since 1780 as *Spongia articulata* Schmidel, 1780 (= *Casearia articulata)* from the Jurassic deposits (for detailed description, synonymy and references about *C. articulata* see Müller, 1974). In general, the hexactinellid sponges are not abundant in Triassic shallow-water carbonates or reefs biotopes. Wu & Xiao (1989), Wu (1990) and

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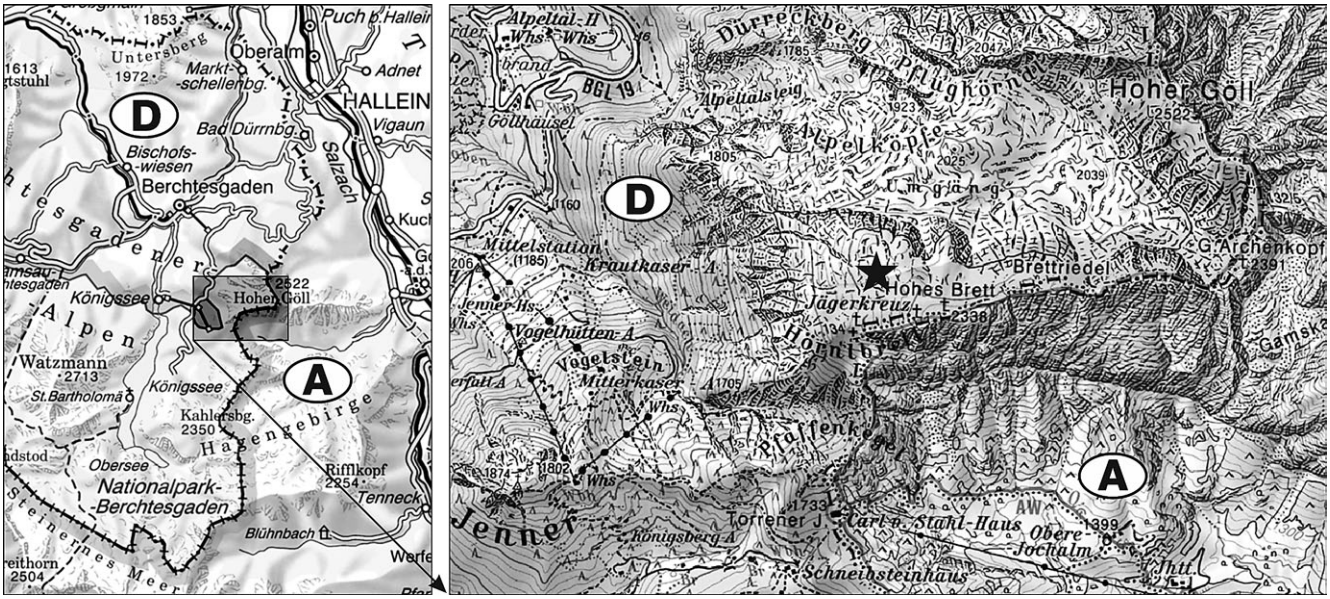



Text-Fig. 1.
Location, where the sample with *Casearia alpina* nov. sp. was found.

Rigby et al. (1998) described some chambered hexactinellid sponges from the Late Triassic (Carnian) reefs of northwest Sichuan, China. Boiko (1990) reported several chambered hexactinellid sponge taxa from the Norian–Rhaetian and Jurassic deposits of Caucasia. Senowbari-Daryan & Hamedani (1999) described the genus *Casearia* from the Norian–Rhaetian Nayband Formation of central Iran. Keupp et al. (1989) reported uncertain chambered hexactinellid sponge (*Casearia*) from Upper Triassic (Carnian) reef boulders of the Cassian Formation of the Dolomites, northern Italy. Until now hexactinellid chambered sponges have not been known from the Norian–Rhaetian Dachstein reefs of the northwest Tethyan realm (Alpine-Mediterranean region). However, one of the authors (H.Z.) found in the Dachstein reef limestone of the Hohe Göll (see Zankl, 1969; Braun, 1998) the first chambered hexactinellid sponge which is described in this paper. In contrast to the hexactinellid sponges, the hypercalcified chambered sponges are, beside scleractinian corals, very abundant in the Hohe Göll reef and some of them were described by Zankl (1969) and by Senowbari-Daryan (1990) and were also mentioned by Braun (1998). Senowbari-Daryan (2009) described the hypercalcified sponges (sphinctozoans and inozoans) of the Dachstein reef limestone of the Gosaukamm in Austria.

## Investigated Material and Locality

The investigated material comprises just one specimen in one thin section which was collected by Heinrich Zankl on the Hohes Brett of the Hohe Göll. It was collected from the so called "südliche Dolinenreihe" at the Hohe Brett (R: 4578730; H: 5272439; 2252 m above sealevel; Coordinate reference system: DHDN Zone 4; Text-Fig. 1). It derives from the central reef area. The stratigraphic age of the sample is Upper Sevatian – Lower Rhaetian. The thin section with *C. alpina* nov. sp. is deposited in the "Bayerische Staatssammlung für Paläontologie und historische Geologie", Munich (Inventary-Nr.: "BSPG 2010 I 90").

## Paleontology

### Class Hexactinellida Schmidt, 1870

### Order Innaecoeliida Boiko, 1990

The order Innaecoeliida was defined by Boiko (1990: 124) as chambered sponges with hexactinellid lattice. Only one family – Innaecoeliidae – was attributed to this order. Innaecoeliidae is synonymed with questionmark with Caseariidae Schrammen by Finks & Rigby (2004).

### Family Caseariidae Schrammen, 1936

### Synonymy: Innaecoeliidae Boiko, 1990

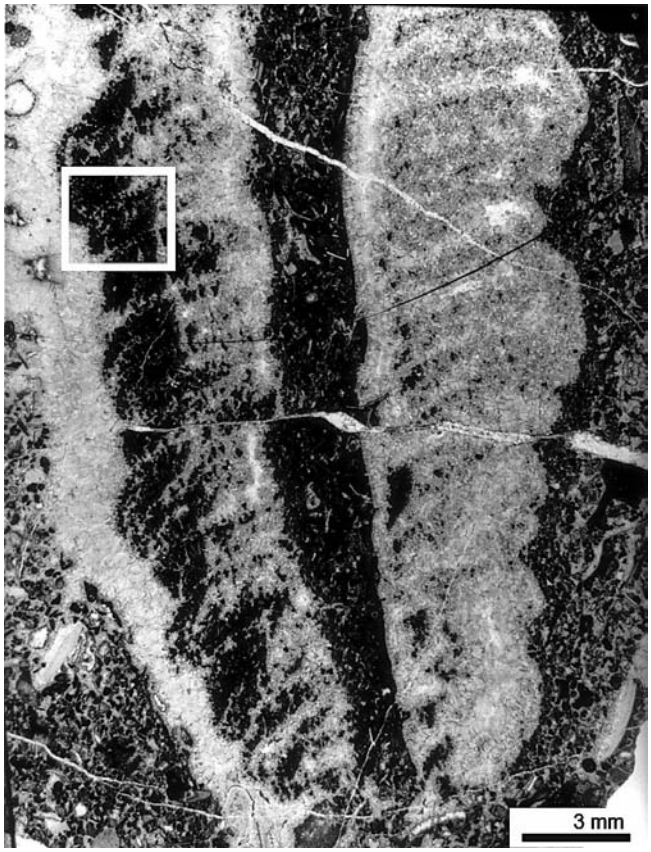
Discussion: The family Caseariidae Schrammen is considered to be a subfamily of the family Craticulariidae by Finks & Rigby (2004). They noted on page 476 that three families – Craticulariinae, Laocoetidinae, and Leptophragmatinae – are included in the family Craticulariidae, but the subfamily Caseariinae is attributed as the fourth of this family. Because of the chambered construction of representatives of the Caseariidae this family is considered to be an independent family containing the type genus *Casearia* Quenstedt and the family Innaecoeliidae with the three genera described by Boiko (1990) *Caucasocoelia, Pseudoverticillites*, and *Inaecoelia*.

### Genus *Casearia* Quenstedt, 1858

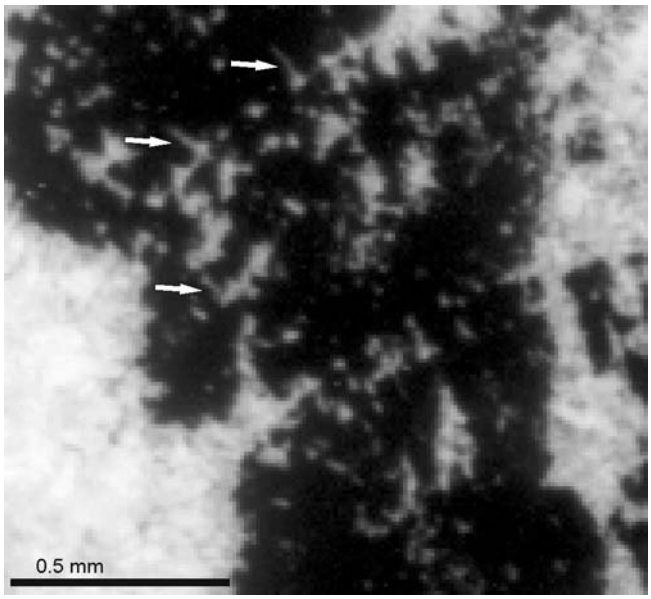
Synonymy: *Innaecoelia* Boiko 1990.

Diagosis: See Finks & Rigby 2004: 486.

Type species: According to Kolb (1910: 187), Müller (1974: 3), Mehl (1992) and Rigby et al. (1998) *Spongia articulata* Schmidel (1780) is the type species of *Casearia;* Finks & Rigby (2004: 486) erroneously described, however, *Scyphia articulata* Goldfuss (1826) as type species of the genus. In fact, Goldfuss (1826–1833) described a sponge species as *"Scyphia articulata nobis"* (pp 8–9) and illustrated two specimens of this species (Pl. 3, Fig. 8 and Pl. 9, Fig. 9) without mentioning the work of Schmidel (1780).




Text-Fig. 2.
*Casearia alpina* nov. sp. Holotype.
The longitudinal section shows the recrystallized skeleton, but the internally chambered construction is clearly recognizable at the left side of the picture. For magnification of the area marked with rectangle see Text-Fig. 3.




Text-Fig. 3.
The magnification from Text-Fig. 2 shows two lattice of chamber walls, which are built by 2 layers of amalgamated hexactine spicules.
Arrows indicate three spicules with long rays extended into the chamber interiors. Chamber interiors contain skeletal filling, which are composed of irregularly arranged hexactine spicules.

Further species: *Casearia depressa* Kolb (1910), *Casearia eurygaster* Zittel (1878). Both species including the one that was described as *Innaecoelia pamirica* Boiko (1990), as well as *Innaecolia kurtecia* Boiko (1990) were synonymed with *Casearia articulata* by Mehl (1992). Following the opinion of Pisera (1997) we do not accept the synonymy list of Mehl (1992). According to the description of Kolb (1910), e.g. *C. depressa* is a separate species and can not be synonymed with *C. articulata*.

### *Casearia alpina* nov. sp.

(Text-Figs. 2, 3).

Derivatio nominis: After the occurrence of the sponge in the Alps.

Holotype: The description of the species is based on only one specimen illustrated in Text-Figs. 2, 3.

Locus typicus: "Südliche Dolinenreihe" at the Hohe Brett, in the massif of the Hohe Göll (R: 4578730; H: 5272439).

Stratum typicum: Dachstein reef limestone, Norian–Rhaetian.

Diagnosis: Cylindrical to conical multi-chambered sponge with an axial spongocoel of retrosiphonate(?) type. Chambered construction is not recognizable from the outside of the sponge. Chamber walls are composed of a lattice built by hexactine spicules. Chamber interiors contain irregularly arranged hexactine needles.

Material: One specimen.

Depository: Bayerische Staatssammlung für Paläontologie und historische Geologie, Munich (Inventary-Nr. "BSPG 2010 I 90").

Description: Since there is only one specimen available, the description of the holotype (illustrated in Text-Figs. 2, 3) corresponds to the description of the sponge.

The cylindrical to conical sponge is at least 40 mm high with a diameter of 27 mm at the upper part of the sponge. It was certainly longer than 40 mm because it is cut at the upper end. An axial spongocoel, probably of retrosiphonate type and about 5 mm in diameter (almost 20 % of the whole diameter measured at the upper part of the sponge) passes through the entire length of the sponge. The specimen is composed of numerous low and crescent-shaped chambers whose number cannot be identified because of strong recrystallisation of the skeleton. The crescent-shaped chambers made the chambered construction disappear at the outside of the sponge. The height of the chambers varies between 2.5 mm and 3.0 mm. Chamber walls are of nearly constant thickness of 0.4 mm and built by two layers of amalgamated hexactine spicules. The large rays of hexactines, which pass into the chambers interior (Text-Fig. 3: arrows), were measured with 0.4 mm. Chambers interior contains irregularly arranged hexactine spicules.

The sponge is irregularly annulated on the surface. The outer annulation does not reflect the internal chambered construction.

Comparison: The following species are attributed to the genus *Casearia*.

Jurassic: *Casearia depressa* Kolb (1910); *Casearia eurygaster* Zittel (1878); Triassic: *Casearia articulata* Schmidel (1780: in Rigby et al. 1998; Senowbari-Daryan & Hamedani 1999); *C. oblata* (Wu, 1990), *C. decursiva* (Wu, 1990), *C. pamirica* (Boiko, 1990), and *C. kurtekia* (Boiko, 1990).

*C. alpina* nov. sp. differs from the Triassic representatives of *Casearia* with ring-shaped chambers, described as *C. articulata* from the Carnian of north-central Sichuan, China, by Rigby et al. (1998) and from the Norian–Rhaetian Nayband Formation by Senowbari-Daryan & Hamedani (1999) by the crescent-shaped chambers responsible for the disappearance of the chambered construction from the outside of the sponge. *C. alpina* differs from *C. pamirica* (Boiko), and from *C. kurtekia* (Boiko), which are synonymed with *C. articulata* by Rigby et al. (1998), also by its crescent-shaped chambers.

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