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Colospongia cribrifera nov. sp. and *Parastylothalamia minima* nov. sp. ("Sphinctozoa", Porifera) from the Norian of Taurus Mountains, Turkey

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Abstract

Two chambered hypercalcified sponges, *Colospongia cribrifera* nov. sp. and *Parastylothalamia minima* nov. sp. are described from the Norian reef boulders exposed around the town of Terziler, Taurus Mountains, south Turkey. *Colospongia cribrifera* is characterized by partly perforated and partly imperforated chamber walls and additionally sieve-like plates or cribribulla in the chamber exowalls. *Parastylothalamia minima* is one of the smallest chambered sponge known in the fossil record. The siphonate sponge is characterized by evenly perforated chamber walls and by scattered pillars within the chamber interiors.

Keywords

Colospongia, *Parastylothalamia*, Triassic, Norian, Reef, Taurus Mountains, Turkey.

1. INTRODUCTION

Norian reef boulders (generally called "cipit"-blocks, reworked reef carbonates), embedded within the siliciclastic deposits of a marine maginal basin (Kasımlar Basin), are exposed in several localities in Taurus Mountains, south Turkey. The most abundant organisms within these boulders are hypercalcified sponges, followed by scleractinian corals and other reef builders. The fossil preservation in some of these localities is excellent, e. g. the most famous locality with aragonite preservation of fossils near the town Dereköy, west of Antalya. Some hypercalcified sponges were described from these localities, e. g. from the "Tavuk Çeşme" locality by Senowbari-Daryan & Link (2011, further references).

Sponges described in this paper, were collected from the "cipit"-blocks exposed around the town of Terziler (Fig. 1). These reef boulders (cipits) occur as debris flow, with sometimes single blocks, but mostly as accumulations. The size of Terziler's boulders varies from 0.5 to 3 m.

Inventory: A polished slab (Pl. I, fig. b) of the investigated material is deposited at the Forschungsinstitut und Naturmuseum Senckenberg, Frankfurt/Main (Germany).

2. SYSTEMATIC PALEONTOLOGY

Hereafter two new species of hypercalcified chambered sponges ("Sphinctozoa" Steinmann, 1882 or Thalamida De Laubenfels, 1955) are described. Because of polyphyletic nature of "Sphinctozoans" this term can not be used in systematic level. "Sphinctozoans" are known from Cambrian (with some gaps in Palaeozoic) up to Recent (recent only one species) and are – together with non-chambered "Inozoans" – very abundant in younger Palaeozoic (Carboniferous-Permian) and Triassic time intervals. The chambered construction is developed in all groups of sponges, including archaeocyathids, demospongids, hexactinellids, heteractinids and calcispongids. Sphinctozoans occur in shallow-water deposits, particularly in reef and reefal biotopes. They are known from all continents and were abundant in tethyan realm. For more information about the systematic, number of genera and their stratigraphic range and palaeogeographic distribution see Senowbari-Daryan, 1991, Senowbari-Daryan & Rigby, 2011.

Class Demospongea Sollas, 1875
Subclass Ceractinomorpha Lévi, 1953
Order Vaceletida Finks & Rigby, 2004
Family Colospongiidae Senowbari-Daryan, 1990
Subfamily Colospongiinae Senowbari-Daryan, 1990

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Synonymy: Colospongiidae Boiko & Belyaeva, 1991: 143 (in Boiko *et al.,* 1991); Parauvanellidae Wu, 1991: 81; Imbricatocoeliidae Wu, 1991: 88.

Genus *Colospongia* Laube, 1865
Type species: *Manon dubium* Münster, 1841.

***Colospongia cribrifera* nov. sp.**
Pl. I, figs. a-d, Figs. 2-3

Derivatio nominis: *Cribrum* (lat. =) sieve, *ferre* (lat. =) carry. Named for the possession of cribribua (sieve-like plates) within the chamber walls.
Holotype: Longitudinal section illustrated in Pl. I, fig. d (H).
Paratypes: All specimens illustrated in Pl. I, figs. a-c and d (P).
Locus typicus: Reef boulders around the town of Terziler (Fig. 1).
Stratum typicum: Upper Triassic, Norian.
Diagnosis: Small species of the genus *Colospongia* with partly perforated and partly imperforated chamber walls. Additionally sieve-like cribrate plates (cribribulla sensu Finks, 1983) in the chamber exowalls. Chamber-shape egg-like, chamber interiors without any filling skeleton and vesiculae.
Material: Numerous specimens in one thin section and a polished slab of the sample 19J2.
Inventory: The polished slab (Pl. I, fig. b) is deposited at the Forschungsinstitut und Naturmuseum Senckenberg, Frankfurt/Main (Germany), inventory number XXVI 562 (the illustrated thin section is unfortunately lost).
Description: The chain-like specimens of this species are composed of several egg-shaped and moniliform

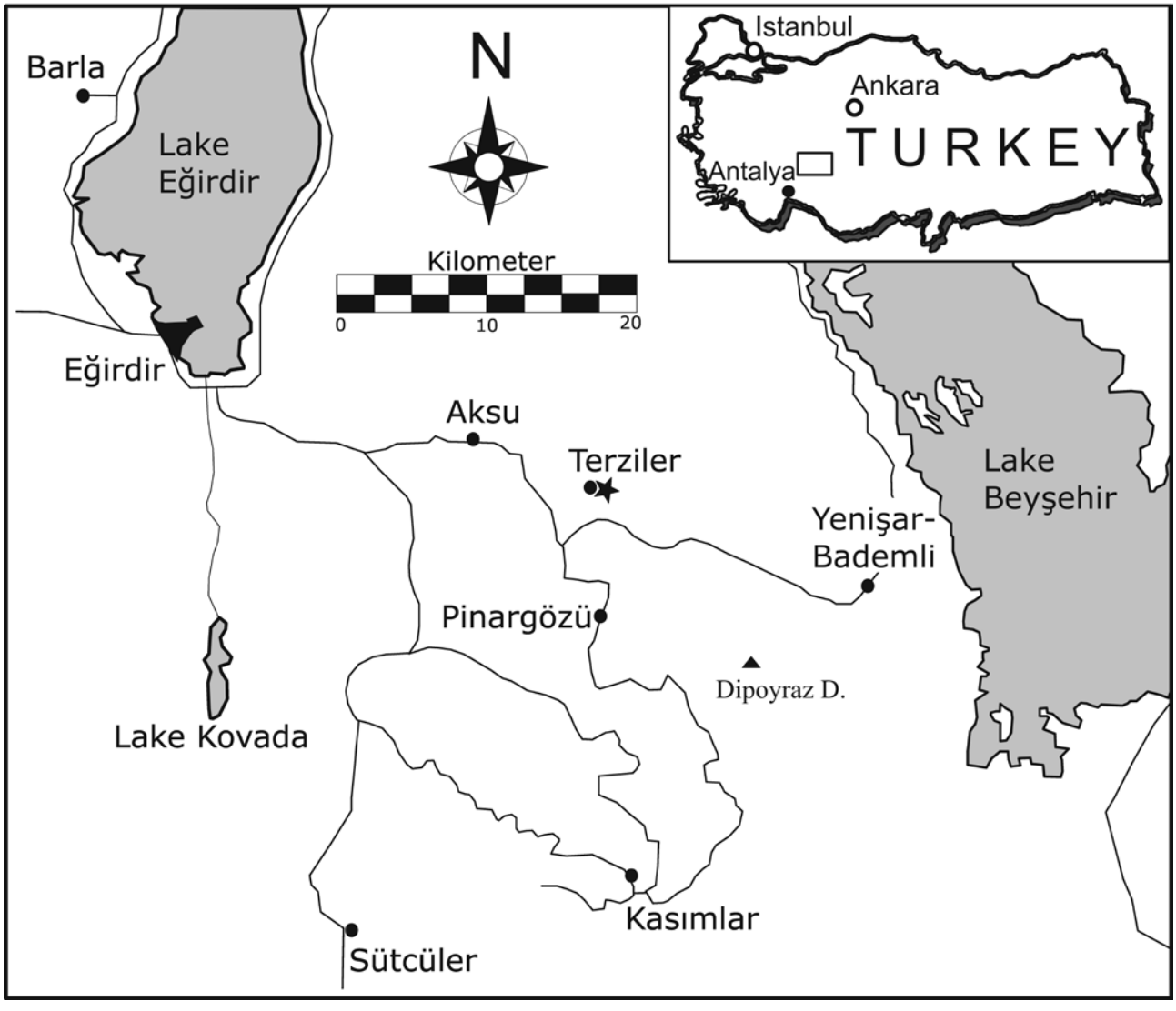

Fig. 1: Geographic position of the locality near the town of Terziler.

(one above the others) arranged chambers. The chamber heights as well as their diameter vary between 4 mm and 7 mm. Usually the chambers are higher than wide. As clearly recognizable in the holotype (Pl. I, fig. d/H) the chamber walls are partly pierced with small pores and partly imperforate. The thickness of chamber walls is variable, usually 0.4 mm to 0.7 mm. The most unique characteristic of the sponge are sieve-like or cribrate plates (the cribribulla according to Finks 1983) within the exowalls. Each cribribullum is located at the base of an alveola (deepening) with a diameter of usually 1 mm (0.6 mm-2 mm). The cribribulla-plates are usually thinner than the chamber walls. Chamber interiors are without filling skeleton and vesiculae.

Comparison: Species of *Colospongia* are characterized by more or less equally distributed pores within the chamber exo- and interwalls. Additionally large openings may occur within the exowalls, like in the holotype illustrated in Laube, 1865: pl. 1, fig. 16; compare Ott, 1967: pl. 4, fig. 2). Sieve-like plates (cribribulla), as occurring in the new species, are known only from *Colospongia wahleni*, described from the lower Norian of the Hells Canyon, Oregon, USA by Senowbari-Daryan & Stanley (1988). *Colospongia cribrifera* nov. sp. differs from *C. wahleni* by the small dimensions of the sponge skeleton, the skeleton elements, the chamber shape and by the partly perforated chamber walls. Vesiculae, as occurring within the chamber interiors in *C. wahleni*, are completely missing in the new species.

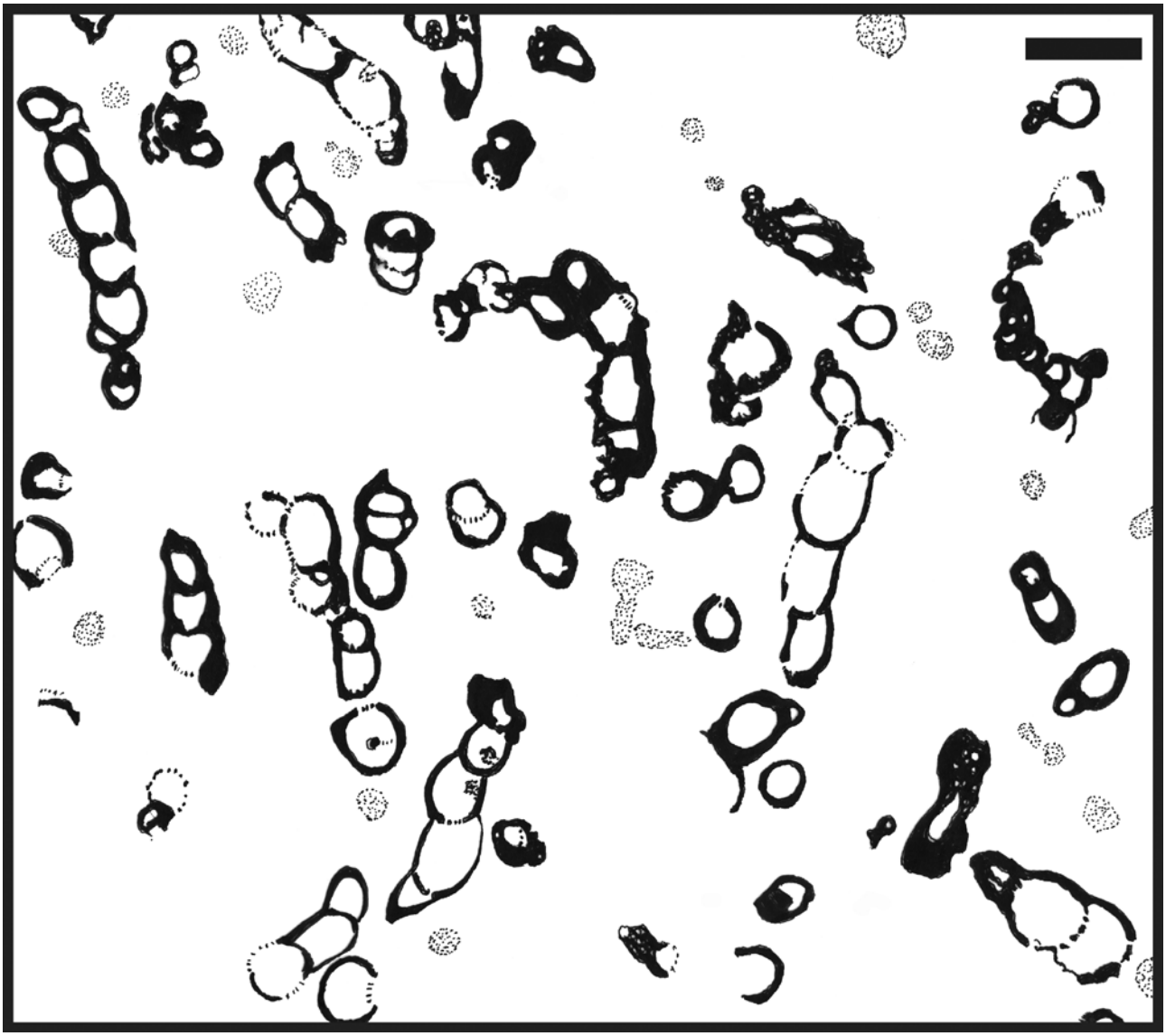

Fig. 2: Longitudinal and cross sections through numerous specimens of *Colospongia cribrifera* nov. sp. from the Norian reef boulders of Taurus Mountains. Most specimens clearly show the partly perforated and partly imperforated chamber walls. *Parastylothalamia minima* nov. sp. is shown as dotted areas. Scale bar 10 mm.

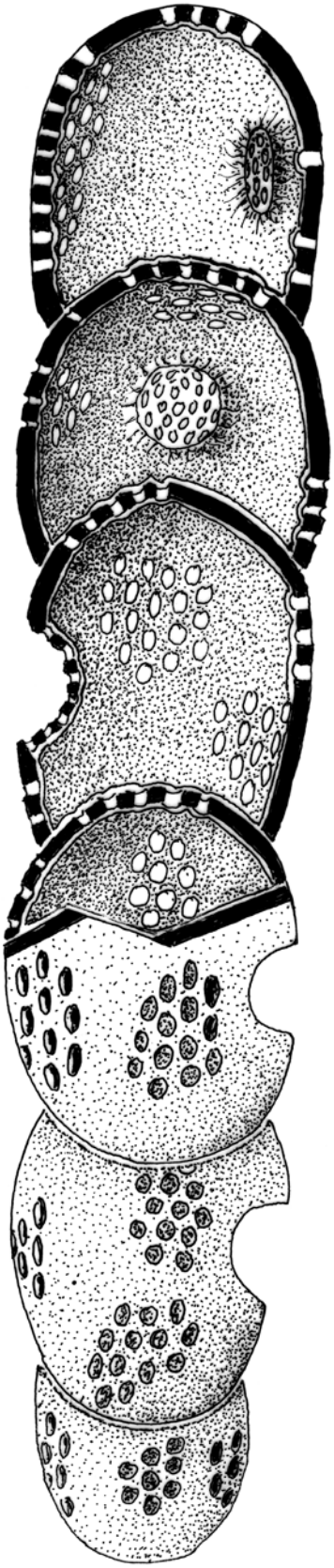

Fig. 3: Reconstruction of *Colospongia cribrifera* nov. sp. showing the external and internal characteristics of the sponge skeleton and the position of the sieve-plates in the alveola (deepening). Schematic, not to scale.

Family Parastylothalamiidae Senowbari-Daryan & Link, 2011

Genus *Parastylothalamia* Senowbari-Daryan & Link, 2011

Type species: *Parastylothalamia cylindrica* Senowbari-Daryan & Link, 2011

***Parastylothalamia minima* nov. sp.**

Pl. I, fig. e, Pl. II, figs. a-g

Derivatio nominis: *Minimus* (lat. =) smallest, named for the very small dimensions of the sponge.

Holotype: Pl. II, fig. a.

Paratypes: All figs. illustrated in Pl. I, fig. e and Pl. II, figs. b-g.

Locus typicus: Reef boulders around the town of Terziler (Fig. 1).

Stratum typicum: Upper Triassic, Norian.

Diagnosis: Small species of the genus *Parastylothalamia* with scattered trabecular (pillar-like) filling skeleton within the chamber interiors. Spongocoel of retrosiphonate type, chamber walls contain evenly distributed pores. Vesiculae are lacking, spiculae not known.

Material: Numerous specimens in one section and a polished slab of the sample 19J2.

Inventory: The polished slab (Pl. I, fig. b) is deposited at the Forschungsinstitut und Naturmuseum Senckenberg, Frankfurt/Main (Germany), inventory number XXVI 563 (the illustrated thin section is unfortunately lost).

Description: Specimens of this very small species of *Parastylothalamia* occur together with the preceding described species – *Colospongia cribrifera* nov. sp. – in one sample, which was collected near the town of Teziler (Fig. 1). It is one of the smallest known sphinctozoid sponge with a diameter of 2 to 3 mm. Because almost all specimens are cut in cross sections, the sponge height is unknown. The holotype (Pl. II, fig. a), which is cut in a longitudinal section, is composed of five chambers reaching a height of almost 4.5 mm with a diameter of 2.5 mm. An axial spongocoel of retrosiphonate type (diameter about 0.5 mm) is cut in the last two or three chambers. Chamber walls are about 0.2 mm thick and pierced by small and evenly distributed pores. Chamber interiors contain scattered filling skeleton of trabecular type (slender pillars).

Discussion: Skeletal Mg-calcite mineralogy of the genus *Stylothalamia* Ott (1967) was discussed by Senowbari-Daryan & Link (2011). The family Parastylothalamiidae and the genus *Parastylothalamia* was established for stylothalamid sponges with aragonitic skeletal mineralogy occurring in the Norian-Liassic time interval. *Parastylothalamia* is an abundant sponge in the Norian reef boulders in Taurus Mountains. Only the type species – *P. cylindrica* – was attributed to the genus *Parastylothalamia* by Senowbari-Daryan & Link (2011). *Parastylothalamia minima* nov. sp. differs from the type species – *P. cylindrica* – by its extreme small dimensions of the sponge skeleton and the skeleton elements.

3. CONCLUSIONS

The resedimented reef boulders ("cipits") are abundant in the Norian siliciclastic basinal deposits in Taurus Mts. Hypercalcified sponges, followed by scleractinean corals are the most frequent reef builders of these carbonates. The preservation of organisms in the cipits is important for the fossil record in geological history. The two sphinctozoan species, described as new in this paper, were found in such cipits derived from the Anamas Mountains. The primary reef growth zone of the cipits is not exposed.

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Plate I

Figs. a-d: *Colospongia cribrifera* nov. sp. and Fig. e: *Parastylothalamia minima* nov. sp. from the Norian reef boulder of the Taurus Mountains, Turkey. All figs. except fig. b are from thin section 19J2.

Fig. a: *Colospongia cribrifera* nov. sp., magnification of fig. c. Longitudinal section through four chambers of a specimen exhibiting the secondary thickened and partly perforated chamber walls. A cribribullum is cut in the exowall of the second chamber from the bottom.

Fig. b: Numerous longitudinal and cross sections showing the chain-like appearance of the *Colospongia cribrifera* and *Parastylothalamia minima* (arrows). For the distribution of both species in the rock surface see Fig. 2. Polished slab sample 19J2.

Fig. c: Sections through several specimens.

Fig. d: The longitudinal section through four chambers of the holotype (H) exhibits the partly perforated chamber walls and the cribribulla in two chambers (arrows). A cribribullum is cut in a cross section of one paratype (P).

Fig. e: S) *Parastylothalamia minima* nov. sp. The cross and oblique sections through two specimens show the thin and evenly perforated chamber walls. Some trabeculate filling skeleton (pillars) are recognizable within the chamber interiors. K) indicates the thin wall of a sack-like silicosponge (gen. et sp. indet.) composed of one layer of spicules.

Plate I

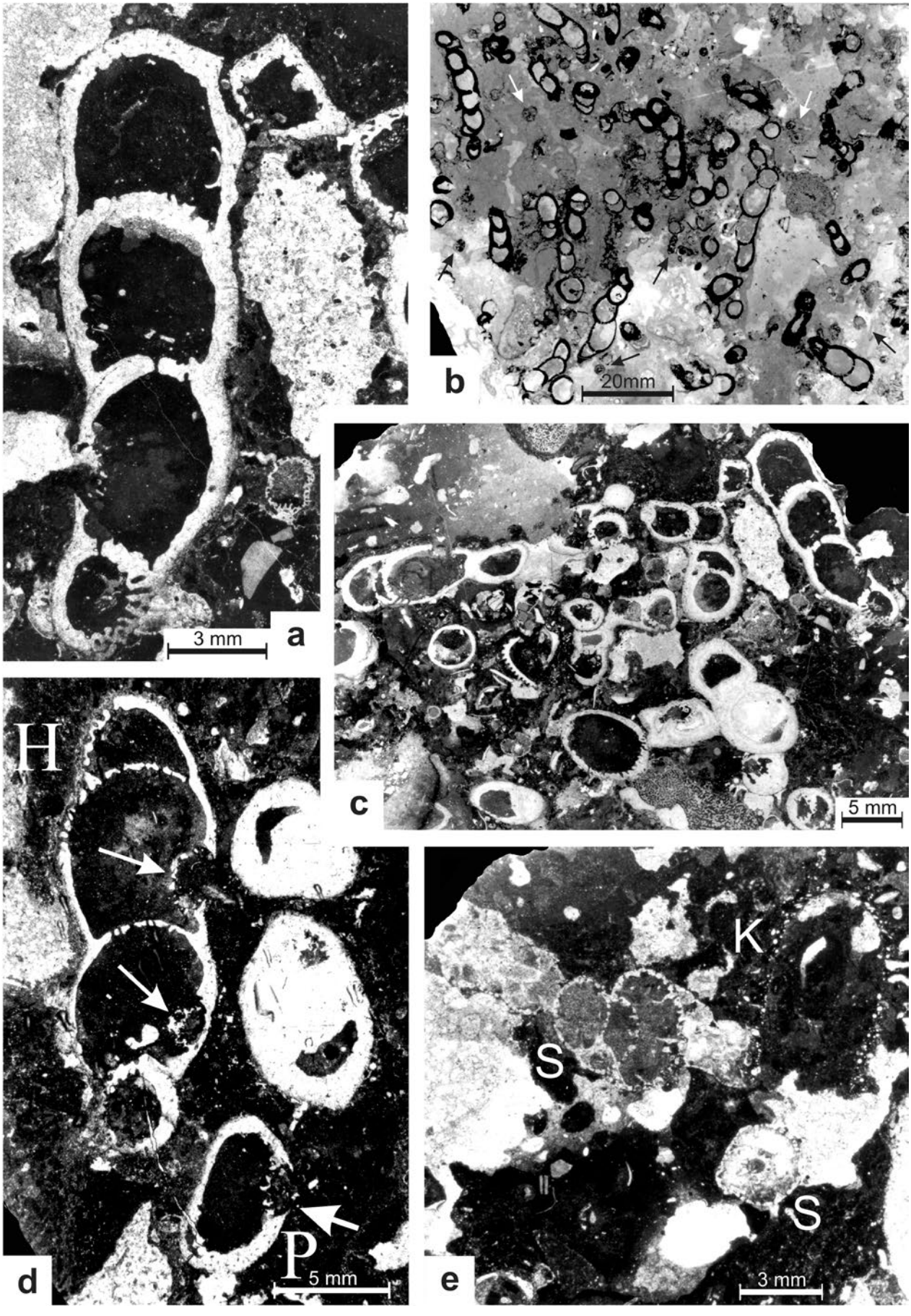

Plate II

Figs. a-g: *Parastylothalamia minima* nov. sp. from the Norian reef boulder of the Taurus Mountains, Turkey. All figs. from thin section 19J2.

Fig. a: *Parastylothalamia minima* nov. sp., holotype. Longitudinal section through five chambers shows the chamber shapes and the well and evenly perforated chamber walls. The spongocoel is cut in the first and last chambers. Some pillars are recognizable within the chamber interiors.

Fig. b: Longitudinal section through a specimen exhibiting the perforated chamber walls. The spongocoel is cut in the middle chamber.

Fig. c: Marginally longitudinal section.

Fig. d: Cross sections through two specimens exhibiting the axial spongocoel and the perforated chamber walls.

Fig. e: Similar section like fig. d.

Fig. f: Cross section.

Fig. g: Marginally longitudinal section exhibiting the evenly perforated chamber walls and a pillar in one chamber.

Plate II