

NEW RECORD OF THE LITHISTID DEMOSPONGE *MORETISPONGIA PYRIFORMIS* (POMEL, 1872) FROM THE MIDDLE EOCENE OF NORTH-EASTERN ITALY (CHIAMPO, VICENZA, LESSINI MOUNTAINS)

VIVIANA FRISONE*, ANTONIO DE ANGELI*

* Museo di Archeologia e Scienze Naturali "G. Zannato", Montecchio Maggiore (Vicenza), Italia. E-mail: museo.scienze@comune.montecchio-maggiore.vi.it; antonio.deangeli@alice.it

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ABSTRACT

We report a new occurrence of the lithistid demosponge *Moretispongia pyriformis* (Pomel, 1872). The specimen is housed at Museo di Archeologia e Scienze Naturali "G. Zannato", Montecchio Maggiore, Italy. This is the first record of *Moretispongia pyriformis* (Pomel, 1872) for the Eocene. Previously the species was reported for the Miocene of North Africa (Algeria) and South Spain. Loose monaxial spicules are documented for the first time.

RIASSUNTO

Nuova segnalazione di demospongia litistide *Moretispongia pyriformis* (Pomel, 1872) dell'Eocene medio dell'Italia nordorientale (Chiampo, Vicenza, Monti Lessini).

Il reperto è conservato presso il Museo di Archeologia e Scienze Naturali "G. Zannato" di Montecchio Maggiore. Si tratta della prima segnalazione mondiale della specie per l'Eocene. La specie era infatti stata finora segnalata nel Miocene del Nord Africa (Algeria) e nella Spagna meridionale. La presenza di spicole isolate monoassiali è documentata per la prima volta.

INTRODUCTION

The bodily preserved sponge fauna from the middle Eocene of Chiampo Valley, Vicenza, in north-eastern Italy, Lessini Mountains, shows a high diversity (MATTEUCCI & RUSSO 2005). A systematic study by FRISONE, PISERA & PRETO (2016) identified thirty-two taxa, with 10 new species (2 new genera), dominated by siliceous sponges with solid skeleton (15 Demospongiae, 17 Hexactinellida). Last occurrence of four genera was extended to Eocene. Two non-lithistid demosponges were also documented: 1) the "coralline sponge" *Astrosclera* sp. reported for the first time in the Cenozoic; 2) the "sphinctozoan" *Vaceletia progenitor*, second worldwide record. Sponges colonized a mixed substrate, eventually forming small sponge clusters. The sponge fauna is essentially autochthonous and lived in the middle-outer portion of a carbonate ramp. It was buried very quickly by volcanoclastic sediments. The original siliceous skeleton was dissolved during diagenesis, pseudomorphs in calcite sparite were formed, peloidal micrite possibly microbial was observed (FRISONE, PISERA & PRETO 2014). A recent donation of a specimen undescribed before in the studied area, lead to a new record of a lithistid demosponge.

GEOLOGICAL SETTING

The studied area is located in the eastern Lessini Mountains, a portion of the Prealps of north-eastern Italy, on the west side of Chiampo Valley, Vicenza (fig. 1). The studied fossil sponge was collected from a tuffite horizon

with arenaceous grain size. For detailed description of the geological setting please refer to FRISONE, PISERA & PRETO (2016) and literature herein.

MATERIAL AND METHODS

The studied specimen was collected at Cengio dell'Orbo quarry (called "Boschetto" di Chiampo in BESCHIN *et al.* 1991; BECCARO *et al.* 2001 and other references) and was recently prepared and donated by one of the Authors (AD). It is now housed at Museo di Archeologia e Scienze Naturali "G. Zannato", Montecchio Maggiore with catalogue number MCZ 5611.

To clean the original surface, the specimen was delicately brushed and washed with water. The top and some parts of the sides of the specimen are still covered with sediment. As methods of study depend on sponge preservation (FINKS 2003), the preparations chosen for the Chiampo sponge fossils were polished hand sections and thin sections (FRISONE, PISERA & PRETO 2016). Reflected light observations on entire specimens were performed with a Leica MZ 125 optical binocular microscope. Measurements were performed with a caliper.

The thin section was studied with petrographic microscopes, under transmitted optical (Leica DM EP T and Zeiss Axiophot) light, at Padova University, Geoscience Department. A 3D model of the specimen was created with the software Agisoft Photoscan. Classification and terminology for sponges follows generally the Treatise on Invertebrate Paleontology, Part E, Porifera (Revised),

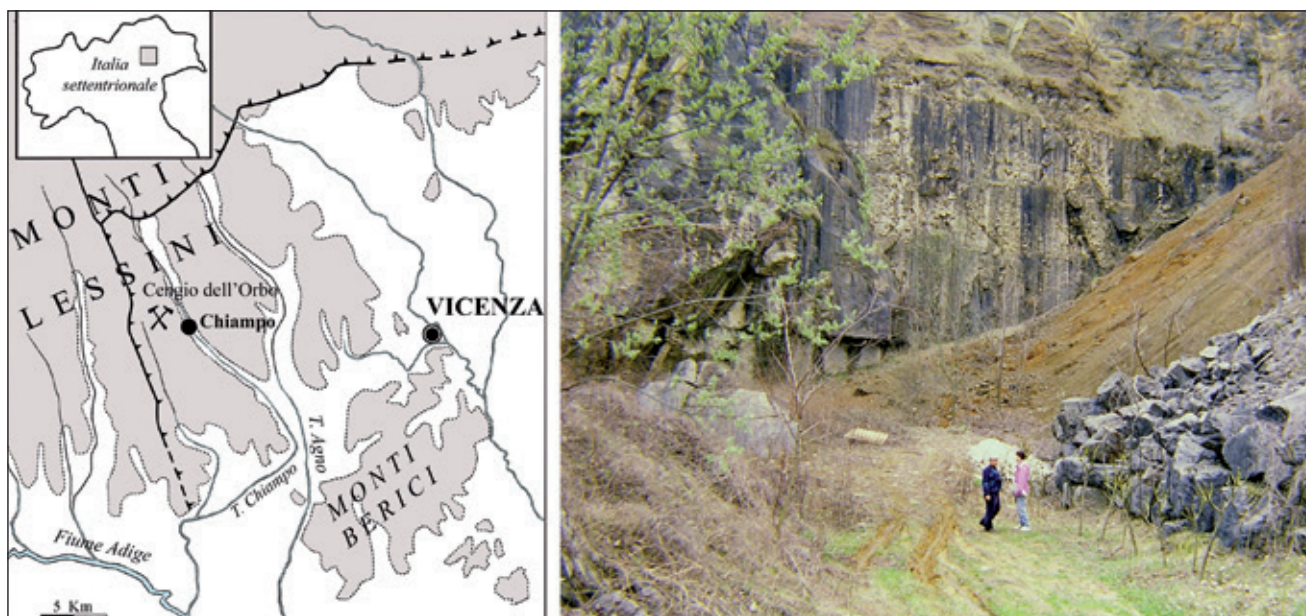


Fig. 1 - Location of Cengio dell'Orbo quarry, Chiampo, where the specimen was collected. On the right the quarry which is not active anymore / Ubicazione della località di Cengio dell'Orbo, Chiampo nella quale è stato rinvenuto l'esemplare esaminato e a destra la cava non più attiva (Photo: De Angeli, 2000).

Volume 2 (KAESLER 2003) and Volume 3 (KAESLER 2004); the Systema Porifera (HOOPER & VAN SOEST 2002) and the Thesaurus of Sponge Morphology (BOURY-ESNAULT & RÜTZEL 1997).

SYSTEMATIC PALEONTOLOGY

Class DEMOSPONGIAE Sollas, 1885

Order TETRACTINELLIDA Marshall, 1876

Suborder SPIROPHORINA Bergquist & Hogg, 1969

Remarks - Demosponges with desmas have been traditionally described as lithistid demosponges (from the order Lithistida Zittel, 1848). Due to the fact that they have been found to be a polyphyletic group sharing just one common character that developed independently several times, e.g., the articulated choanosmal spicules called desmas, this taxon has been abandoned, and the families have been distributed mostly among Astrophorida and Spirophorida (SCHUSTER *et al.* 2015). The term 'lithistid sponges' has thus no taxonomic significance, but exclusively a morpho-functional meaning (FRISONE, PISERA & PRETO 2016).

Family JEREICIDAE Schrammen 1924

Genus *Moretispongia* Breistroffer, 1949

[=*Marisca* Pomel, 1872, p. 192 (type: *M. pyriformis*) sensu Reid 2004

Type species: *Epeudea praegnans* Dumortier, 1871, p. 53

Moretispongia pyriformis (Pomel, 1872)

(fig. 2, 3)

1872 *Marisca pyriformis*, Pomel: p. 192, pl. III ter, fig. 3;
1924 *Stichophyma (sic) pyriformis* Pomel - Moret: p. 14,
pl. I, figs. 6 and 7;

1981 *Strichophyma (sic) pyriformis* (Pomel) - Ott d'Estevou, Termier & Termier: p. 69, pl. 7 figs. 1-3, figs. 8-10?

Material: one specimen (MCZ 5611).

Occurrence: Cengio dell'Orbo quarry, Chiampo, Vicenza, NE Italy, Eocene, Lutetian (this study); Djebel Djambéida and Beni bou Mileuk, Algeria, Miocene (POMEL 1872; MORET 1924); Sorbas, southeast Spain, Miocene (OTT D'ESTEVOU *et al.* 1981).

Description - Pyriform specimen 4.3 cm high, maximum diameter 3.1 cm (fig. 2A). On the top, there is a barely visible rounded hollow (fig. 2 B, D) 0.7 cm in diameter and the sponge wall is 1 cm thick. Part of the side and the top of the specimen is still covered with sediment. The base is partly broken. It shows two protuberances 4 mm high that could be interpreted as remnants of an encrusting base. The external surface has small papilla, approximately 1 mm in diameter, generally hollow (0.3-0.5 mm) in the central part (fig. 2C). At the side of a papilla, monaxial spicules were observed in thin section (fig. 3A). These loose spicules were present on the outer surface of the sponge, both in the lower and in upper part (fig. 3B). They are 200-600 µm long and 15-20 µm thick. Because these spicules were observed in thin section only, they could be genuine monaxial - oxeas, strongyles or styles (tips are not clearly visible) - or fragments of triaene rhabdomes. A single, large tylostyle (fig. 3C) 2400 µm long and 80 µm thick was observed.

No central spongocoel is present but a bunch of vertical canals occur which open in the terminal rounded hollow. Canal openings are not observable because the top of the specimen is covered by sediment. Vertical canals are 0.5-0.7 mm in diameter (fig. 3D). Desmas are strongly calcified, resembling rhizoclonal (fig. 3E). They are 400 µm long and 40-60 µm thick.

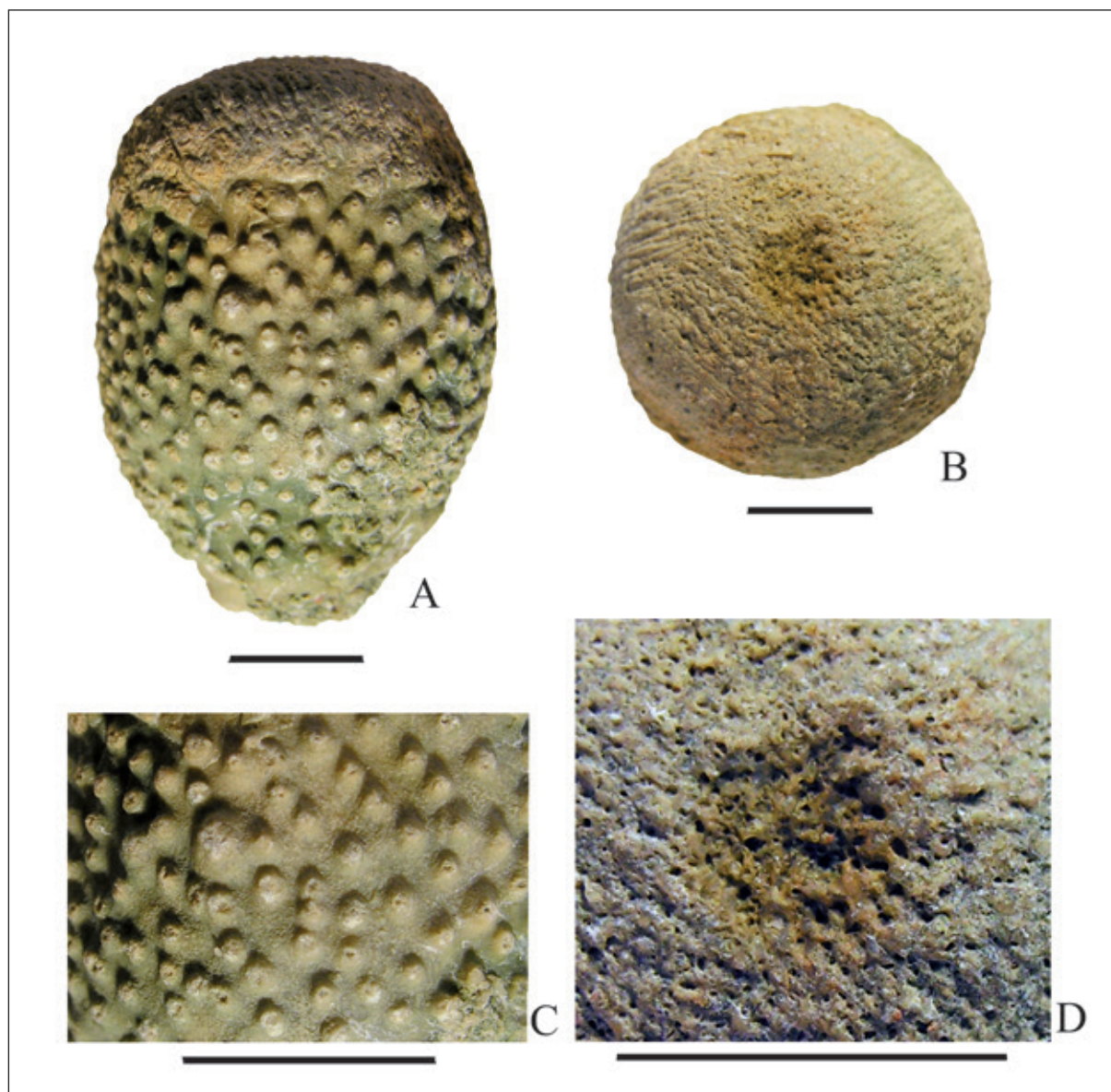


Fig. 2 - *Moretispongia pyriformis* (Pomel, 1872), es. MCZ 5611. A) Lateral view showing pyriform shape, the upper part of the specimen is covered by sediment; B) top view, completely covered by sediment; C) detail of (A) external surface with papilla generally hollow in the central part; D) detail of (B) with a barely visible circular hollow / A) Visione laterale che mostra la forma piriforme, la parte superiore dell'esemplare è coperta da sediment; B) vista dall'alto, completamente coperta da sediment; C) dettaglio di (A) superficie esterna con papille generalmente cave nella parte centrale; D) dettaglio di (B) con una cavità circolare appena visibile (Scale bar / scala metrica = 10 mm).

Remarks - In general shape and the presence of rimmed canals openings (papilla) on the sides the specimen resembles *Stichophyma pyriformis* (Pomel, 1872) from the Miocene of Algeria (POMEL 1872; MORET 1924) and the Miocene of Southern Spain (OTT D'ESTEVOU *et al.* 1981). REID (2004) synonymized the species with *Moretispongia pyriformis*. The genus *Moretispongia* shows a shallow, terminal depression in which exhalant canal openings open. Unfortunately, we cannot observe in detail the top of the specimen as it is encrusted by sediment but a shallow hollow is present. Although poorly preserved, the presence of rhizoclone desmas strength our assignment. Loose monaxial spicules are firstly documented for this species. The genus *Moretispongia* is reported (REID 2004) from Middle Jurassic (Callovian) to Neogene (Miocene).

DISCUSSION

This is the first record of *Moretispongia pyriformis* (Pomel, 1872) for the Eocene. Previously the species was reported for the Miocene of North Africa (Algeria) and South Spain. The present study add a new lithistid demosponge species to the 32 taxa described in FRISONE, PISERA & PRETO (2016) for the Eocene of Chiampo, Italy. The total number of taxa reported is now 33. 15 species (45%) belongs to class Hexactinellida, with 1 species belonging to Lyssacinosida, 7 (21%) Hexactinosida, 7 (21%) Lychniscosida. 18 species belong to Demospongiae (55%) with 16 lithistid (48%) and 2 non-lithistid (6%) (Fig. 4). These data are based on material housed in museum collections.

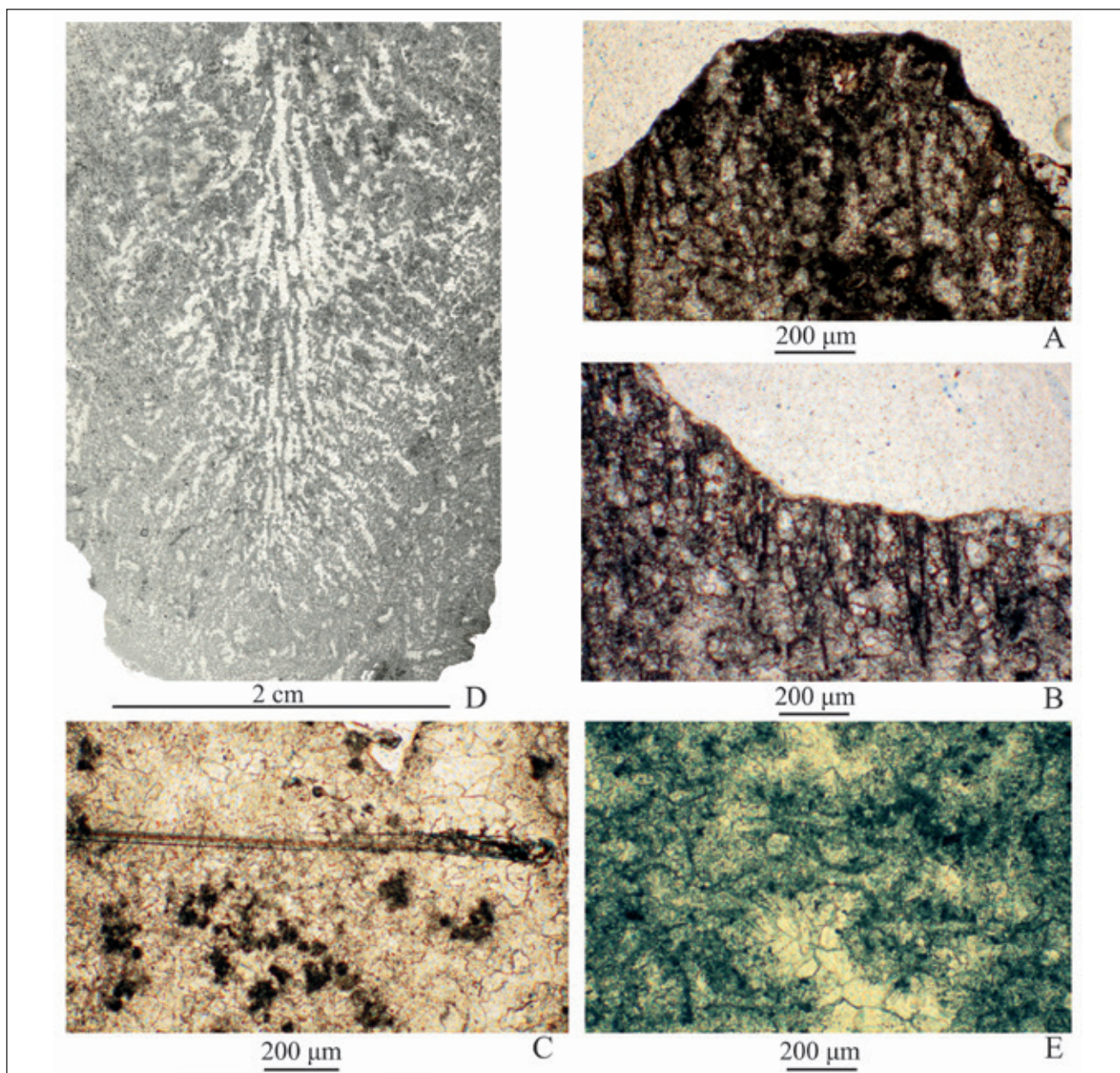


Fig. 3 *Moretispongia pyriformis* (Pomel, 1872), es. MCZ 5611 - microphotographs of thin sections. A) section of papilla; B) upper-outer part of the specimen showing monaxial loose spicules; C) large tylostyle; D) longitudinal thin section with a vertical canals; E) strongly calcified desmas, probably rhizoclonal. / fotografie di sezioni sottili al microscopio. A) sezione di una papilla; B) parte superiore-esterna dell'esemplare con spicole isolate monoassiali; C) grande tilostilo; D) sezione sottile longitudinale con canali verticali; E) desme fortemente calcitizzate, probabilmente rizocloni.



Fig. 4 - Percentage of species belonging to various sponges orders / Percentuale delle specie appartenenti ai vari ordini di spugne.

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