JURASSIC THECOCYATHIDAE (SCLERACTINIA) FROM THE CENTRAL SOUTHERN ALPS: TAPHONOMY AND EVOLUTIONARY SIGNIFICANCE

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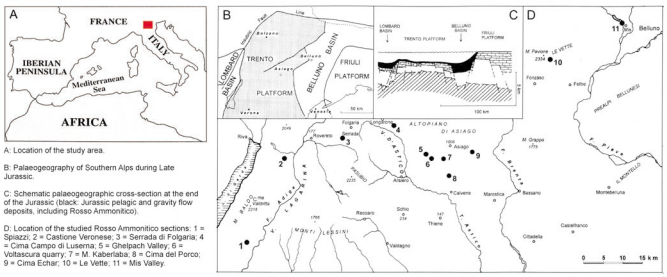
LOCALITIES

Macrofossils from the Late Jurassic (Oxfordian) Rosso Ammonitico cherty pelites and cherty limestones exposed in the Central Southern Alps (North Italy) are represented **almost exclusively by rhyncholites, aptychi, belemnites, crinoids, and solitary corals** ①. Several specimens of the latter were illustrated by Laub (1994: Palaeontolographica 234, 89-166) and assigned to **micrabacid** species *Stephanophyllia suevica* Quenstedt. A new, large collection of these corals from various localities in the Central Southern Alps ② provided new insights into their unusual preservation, and possible phylogenetic relationships.

① Rhyncholites, crinoids, and solitary corals from Serrada di Folgaria locality (3 on the map)

②



A: Location of the study area.

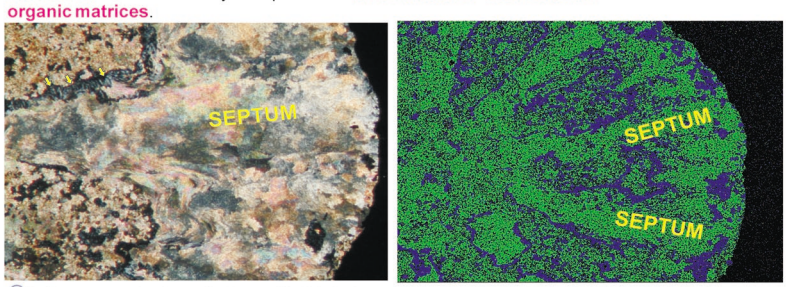
B: Palaeogeography of Southern Alps during Late Jurassic.

C: Schematic palaeogeographic cross-section at the end of the Jurassic (black: Jurassic pelagic and gravity flow deposits, including Rosso Ammonitico).

D: Location of the studied Rosso Ammonitico sections: 1 = Spiazzi; 2 = Castione Veronese; 3 = Serrada di Folgaria; 4 = Cima Campo di Luserna; 5 = Ghelpach Valley; 6 = Voltascura quarry; 7 = M. Kaberlaba; 8 = Cima del Porco; 9 = Cima Echar; 10 = Le Vette; 11 = Mis Valley.

TAPHONOMY

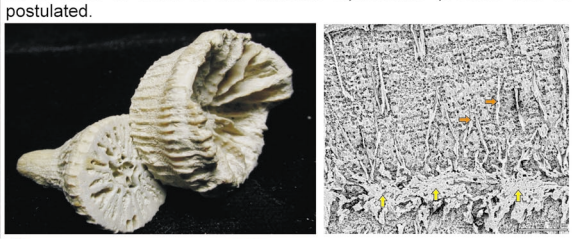
The investigated **corals have calcitic**, diagenetically altered skeletons ③ though skeletal parts of all other **organisms that originally had aragonitic mineralogy are not preserved** (e.g., the only cephalopod fossil remains are originally calcitic rhyncholites, aptychi and belemnite rostra whereas their originally aragonitic phragmocones are not preserved, or occur as molds only). Coralla may be attached to belemnites (RIGHT PHOTO) and aptychi; occasionally imprints of non-preserved shells on coral bases hint at aragonitic mineralogy of some substrates. We speculate that **differences in diagenetic pathways** of coral vs. mollusc skeletons, and resulting **selective loss of mollusc** and **preservation of diagenetically altered coral skeletons** were caused by compositional **differences of their skeletal organic matrices**.



③ **LEFT**: transverse section of recrystallized septum of the Oxfordian thecocyathid from Central Southern Alps (locality 3) that is enveloped by silicious sheats - arrows (in polarized light) **RIGHT**: microprobe mapping (GREEN Ca, BLUE Si)

It is a known fact that **scleractinian and mollusc soluble organic matrices are different** (i.e., those of scleractinians are highly glycosylated whereas the molluscan matrices are not as shown by stains in 2D-electrophoresis - Dauphin 2001: Inter. Journ. Biol. Macromolec. 28: 293-304). However, detailed geochemical scenario showing how these biochemical differences may influence different taphonomical pathways of corals and molluscs still need to be elucidated.

Similar examples of selective dissolution of originally aragonitic mollusc shells and **preservation of calcitized coral skeletons** have been reported from the Upper Cretaceous deposits of Poland (Gautret, Cuif & Stolarski 2000: Acta.Palaeontol. Pol. 45: 107-118). Remarkably, in both cases, coral skeletons were often silicified ③④ thus geochemical involvement of silica in this unusual taphonomic process can be postulated.



④ Cretaceous ***Coelosmilia*** sp. from Poland (**RIGHT**) neomorphically altered into calcite with silification limited to mid-septal zones (yellow arrows) and former organic envelopes of aragonitic crystals (orange arrow) **LEFT**.

EVOLUTION

The bulk of the investigated solitary corals have an **epithecal wall**, **solid septa** with **smooth distal margin** and, in their axial region, **numerous paliform lobes**.⑤These features conform thus to the thecocyathid and **not micrabaciid diagnosis**. Thecocyathidae Vaughan & Wells, 1943 are considered ancestral in evolution of post-Triassic caryophylliines, one of five traditionally recognized scleractinian suborders, though evolutionary relationships among these groups have not been satisfactory elucidated.

⑤ Assorted thecocyathids from the Oxfordian of Central Southern Alps (**LEFT**). The largest specimen from the Voltascura quarry (locality 6). Note: smooth septal margins, epithecal wall and paliform lobes (yellow arrows)(**RIGHT**).

Much more puzzling is, however, **the problem of the thecocyathid origin**. First thecocyathids (e.g., type species *Thecocyathus tintinabulum* Goldfuss, 1826) appear in Lower Jurassic (Toarcian) deposits in Europe ⑥ but among Triassic "minitrabecular" corals with clearly caryophylliid features it is difficult to determine possible ancestral thecocyathids. On the other hand, **skeletal features of Jurassic thecocyathids** i.e., numerous paliform lobes; septal faces covered by dense, homogenous granulation; and "rounded" distal margins of septa, not the narrow distal septal edges typical of caryophylliids, **suggest phylogenetic relationships with stylophylliids**.⑥ Early Jurassic stylophyllids, contemporaneous with earliest thecocyathids, are morphologically and microstructurally highly diversified including taxa similar to *Thecocyathus* with small, flat coralla having spiny or lobate septa (see **Stolarski & Russo, next poster**).

⑥ **UPPER**: Early Jurassic *(Germany) Thecocyathus tintinabulum* type species of the genus nominotypic for the family and (**LOWER**) Triassic (Austria) *Stylophyllum paradoxum*

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