

EARLY JURASSIC STYLOPHYLLIDS (SCLERACTINIA) FROM NORTHEASTERN SICILY

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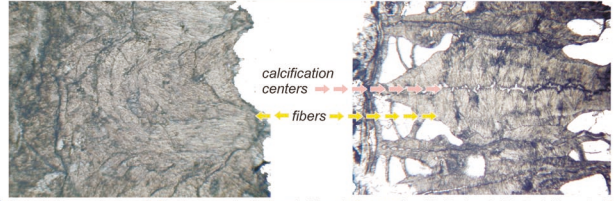
STYLOPHYLLIDS

Stylophyllids are a distinct group of Mesozoic scleractinians with **septa composed of spines**. By overall morphology, they intriguingly resemble some Paleozoic rugosans ① ②

Though stylophyllinan-endamplexid similarity may be another example of pervasive convergence among corals, no data on early skeletal ontogeny or septal insertion pattern have been published that would falsify the hypothesis on their evolutionary relationships.



① Stylophyllid septa are composed of spines ② Simple, dissepimental calices with spiniform septa of the Triassic *Stylophyllum* (left) are similar to the Permian endamplexid *Spineria* (right).



③ *Stylophyllum vesiculatum* (left) with septa and wall composed of fibers (yellow arrow) and "minitracular" *Retiophyllia norica* (right) with small-sized calcification centers (pink arrow) and fibers. Triassic, Fischerswiese, Austria.

Traditionally, **stylophyllid septa** (and the entire skeleton) are considered "non-trabecular" i.e., composed of fibers, whereas **typical scleractinians** have trabecular septa i.e., with clearly delineated **calcification centers (= trabecular axes)** and fibrous stereome. ③ These microstructural arguments were also put forward to suggest discrepancy between stylophyllids and contemporaneous scleractinians.

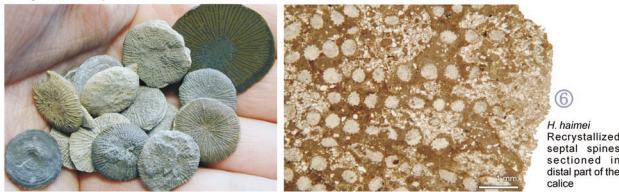
Contrary to the excellently preserved Triassic forms, skeletal characteristics of the post-Triassic stylophyllids is poorly known, thus it is not clear whether microstructural patterns documented in some Triassic stylophyllids can be generalized to their younger representatives. **Early-Jurassic coral fauna from Sicily** illustrated herein **cast light on the post-Triassic evolution of stylophyllids and their architectural diversity**

SICILIAN CORALS

Early Jurassic carbonate deposits yielding corals illustrated herein crop out in northeast Sicily. They are a part of the Longi Nappe sedimentary sequence which consists of the series of marine deposits dated from the Lower Jurassic to Eocene. **Corals have been collected from the marine Sinemurian Black Limestones** ④ overlying Hettangian transgressive, coastal-deltaic Longi Sandstones. Sinemurian age of Black Limestones is supported by occurrence of the ammonites *Amioceras speciosum* and *Epiphoceras carinatum* that indicate an interval between the *Coroniceras bucklandi* and the *Arietites obtusum* Zones

Sicilian collection consists of ca. 50 specimens of discoidal *Haimeicyclus haimiei* (Chapuis & Dewalque, 1853), 1 trochoidal *Stylophyllopsis* sp. cf. *S. rugosa*, and 11 cylindrical *Stylophyllopsis* sp. A.

Haimeicyclus haimiei (Chapuis & Dewalque, 1853) ⑤
As judged by juveniles of *Haimeicyclus haimiei* (Chapuis & Dewalque, 1853) attached to the substrates and earliest ontogenetic portions of the adult coralla ⑦, **early septal ontogeny follows a cyclic pattern** recognized in **typical scleractinians** (conversely, in other supposed paleozoic corals descendants-pachythecalines-earliest ontogeny closely resembles a rugosan serial pattern).
The skeleton is completely recrystallized ⑥ (it has entirely calcitic mineralogy as proven by X-ray diffraction)



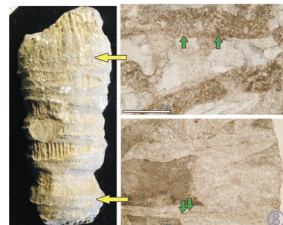
⑤ *Haimeicyclus haimiei* (Chapuis and Dewalque, 1853)

Stylophyllopsis sp. A

Septa sectioned in proximal parts of coralla show a **continuous and narrow mid-septal zone** whereas their more **distal portions** consist of **fused spines**. ⑧

Mid-septa zone is composed of row of about 80µm bodies that, most likely, represent **vestiges of calcification centers**. In this respect, *Stylophyllopsis* sp. A. resembles "minitracular" corals (=Caryophyllina), in which mid-septal zone consists of small-sized calcification centers aligned in a row or zig-zag line.

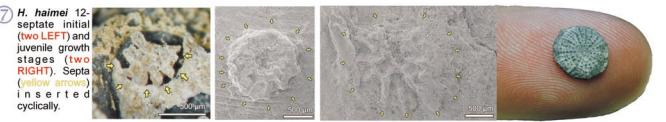
On the other hand, spines that dissociate from adaxial regions suggest **transitional "minitracular"-stylophylline** skeletal architecture of that species.



⑧ *Stylophyllopsis* sp. A. Corallum (LEFT) sectioned in proximal portion (LOWER-RIGHT) shows narrow "mid-septal" zone (green arrows) whereas section of distal portion (UPPER-RIGHT) shows typical septal spines (green arrows)



④ Schematic map of Sicily (LEFT) showing geographic position of outcrops with Early Jurassic scleractinians (asterisk). RIGHT: geological section (after Lentini 1973, Boll. Soc. Paleontol. Ital. 12: 23-75) showing strata sampled for corals (asterisks).

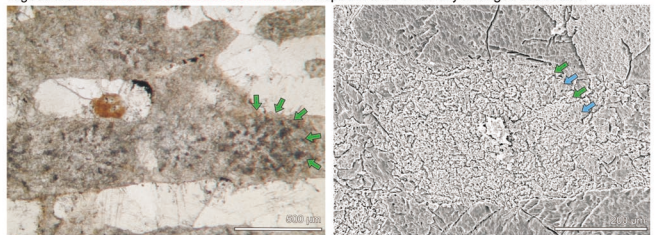


⑦ *H. haimiei* 12-septate initial (two LEFT) and juvenile growth stages (two RIGHT). Septa (yellow arrows) inserted cyclically.

Stylophyllopsis sp. cf. *S. rugosa*

Early juvenile portions of *Stylophyllopsis* sp. cf. *S. rugosa* coralla are not preserved, however, their skeleton, though diagenetically altered (entirely calcitic mineralogy as proven by X-ray diffraction), reveal traces of original microstructure; transverse sections of spines show a **star-shape pattern** in organization of **internal rod-shape structures**. ⑨

In transmitted light, rod-shape structures are dark-grey and form the core of granulations on septal spines surface. EDS mapping does not indicated enrichment of "dark rods" in Mn, Fe or Si, elements typical of diagenetic minerals. However, lightly **etched polished sections** show that neomorphic crystals in regions of "dark rods" possess distinct, fine-porous pattern of etching (**pockmarked surface**), in contrast to much less porous texture of etched crystals outside the "dark rods" zone. Pockmarked surface suggests occurrence of mineral or organic inclusion that undergo preferential etching. Most likely, densely pockmarked crystals arranged in star-like patterns in septal spines of Sicilian *Stylophyllopsis* sp. cf. *S. rugosa* are **remnants of calcification centers** developed in axes of radially arranged trabeculae.



⑨ *Stylophyllopsis* sp. cf. *S. rugosa*. LEFT Septal spines with radiating rod-like structures (green arrows) in transmitted light. RIGHT SEM picture of etched septal spine with pockmarked surface of rod-like structure (green arrows) in contrast to much less porous crystals outside the zone (blue arrows).

CONCLUSIONS

⑩ **Stylophyllids were much more microstructurally diversified** than is traditionally proposed. Also new observations on well preserved Triassic stylophyllids indicate diverse microstructural patterns.

⑩ **Morphological and microstructural plasticity of the post-Triassic stylophyllids** contribute to the hypothesis of their evolutionary **relationships with other scleractinians** i.e., **thecocyathids** (Stolarski & Dieni, see next poster).

⑩ **Early ontogeny** of Jurassic stylophyllids, **do not** provide any crucial arguments that would support the hypothesis of their **rugosan ancestry**.

