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Feeding in Oligotrophic Water: Gill Structure of *Pinctada radiata* and *Spondylus gaederopus*

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Whereas most research on marine bivalve feeding focuses on temperate regions with abundant food particles, tropical waters present a different challenge. These oligotrophic environments are dominated by pico and nanoplankton (≤2 μm). Studies on temperate bivalves have shown that particle capture is very low at ≤ 4 μm. Thriving populations of oligotrophic-water bivalves, including the aquaculturally important genus such as Pinctada, thus appear paradoxical. To better understand the trophic biology of oligotrophic–water bivalves, two common Mediterranean species were sampled and their pallial organs were observed using histology and scanning electron microscopy (SEM). *Pinctada radiata* and *Spondylus gaedropus* were collected in Greece and fixed in 2% glutaraldehyde – cacodylate and brought to the Isomer Lab, University of Nantes.

Our study results revealed both species have plicated, heterorhabdic filibranch gill. *P.* radiata has a ventral particle groove, while *Spondylus sp.* does not. Both species exhibit frontal and lateral cilia whereas there is no evidence of latero-frontal cirri have heretofore been considered essential for small particle capture (≤ 4 μm). Interfilamentar cohesion is effected by ciliated spurs, while interlamellar cohesion is effected by continuous tissue bridges between the abfrontal surfaces of the descending and ascending principal filaments. Histological profiles show a U- shaped principal filament in *P. radiata* which is less ciliated, versus a T-shaped principal filament in *Spondylus sp* which is densely ciliated. These results elucidate the available mechanisms of suspension- feeding in these two oligotrophic-water species. In the future, techniques such as direct observational methods like in-vivo endoscopy, confocal laser scanning microscopy, and sampling inhalant and exhalant water using live specimens can be used to understand in real-time how they perform the retaining process of the smallest particles along with mucocyte mapping. This is because they may employ different strategies and adaptations to obtain the particles.

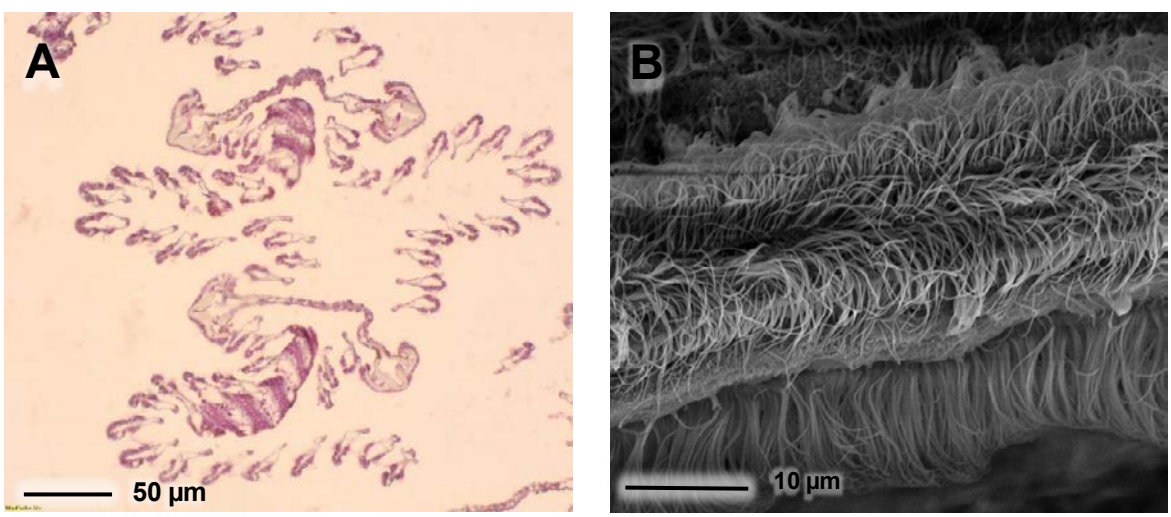

Figure: (A) The histological section of *S. gaederopus* shows a general plicae structure consisting of principal and ordinary filaments, Trichrome staining. **(B)** Frontal view of ordinary filaments consisting of lateral cilia and frontal cilia