New Cyclophoridae Species in Hong Kong: Investigation on Its Taxonomy Identity and Functionality of Their Periostracal Hairs

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This study describes a novel species of snail in the genus Japonia (subfamily Cyclophoridae, family Cyclophoridae) discovered in Hong Kong. This species is distinguished by unique long, spoon-like periostracal hairs and brown dashed pigment rings on its body whorls and spires—features not observed in any other Japonia species. Morphological analysis revealed significant variations in size and hair coverage. Local databases could not classify the species due to outdated taxonomic information, and a global literature review confirmed its uniqueness. To investigate the function of the periostracal hairs, buoyancy experiments demonstrated a strong statistically significant correlation ($p < 0.0001$) between hair coverage and ability to remain afloat, suggesting adaptation to wet environments. However, wind resistance experiments revealed that the hairs did not assist in propulsion but instead induced rotation, implying a different functional role. Additional hypotheses suggest the hairs may aid in defense against predators, such as invasive flatworms, or potentially assist in the dispersal of pollen or spores, though further evidence is needed. This study highlights the ecological importance of periostracal hairs and their potential adaptive functions and is the first study on the documentation of this species. Given increasing threats to biodiversity, further molecular studies are essential to enrich the snail gene pool and to inform conservation efforts for Hong Kong's unique snail populations.

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