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Too Turbid for Nemo: Suspended Sediment Impacts Gills and Favours Pathogenic Bacteria in Clownfish Larvae

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The Great Barrier Reef (GBR), arguably the most pristine and best-managed coral reef in the world, has experienced a 400-800% increase in sediment inputs over the past 200 years. Further increases due to port expansions, dredging, shipping, and continued coastal agricultural and industrial development are inevitable. Increased sedimentation and turbidity impacts species composition and distribution patterns, but the underlying mechanisms are unknown. We examined the gill morphology and gill microbiome of clownfish (*Amphiprion percula*) larvae upon exposure to sediment concentrations common in coastal waters of the GBR. Gills exhibited excessive mucous and protective cell layers, resulting in a 56% thicker gill epithelium compared to fish from control conditions. Such changes could impact oxygen transport, which is key to critical life history activities essential to support biological fitness. We also found a shift from 'healthy' to pathogenic bacterial communities on the gills, which could increase disease susceptibility. The impact of suspended sediments at the gill may represent an underlying mechanism contributing to the negative effects that suspended sediments have on fish assemblages. Our findings underscore the necessity for future coastal development plans to consider the adverse effects of suspended sediments on fish recruitment, and consequently fish populations, and ecosystem health.

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