

## Diversity, distribution and evolution of colour patterns in three reef fish families

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Reef-associated teleosts are well-known for their phenotypic diversity, including colour patterns. Studies revealed that patterns of colour markings diverged rapidly and are under ecological and sexual selection. However, the geographical distribution of this diversity was never investigated and thorough comparative analyses among fish families are lacking.

Here, we aim to compare the distribution and the evolution of colour patterns in three reef fish families: the angelfishes (Pomacanthidae) which are exclusively reef dwellers, and the goatfishes (Mullidae) and the snappers (Lutjanidae) which are associated with reefs and other coastal habitats including mangroves, sandbanks and seagrass beds.

Fish colour patterns were described by a combination of binary traits translating the presence/absence of various markings (*e.g.* stripes, spots, blotches...), and then summarized using Principal Coordinates Analyses. Geographic data were recorded for each species, and they were assigned to five main regions. Our taxon sampling reached 70% of the species of each family

Here, we firstly showed the diversity of colour patterns is similar and equally distributed among regions in the three fish families. Functional richness was correlated to species richness, supporting the hypothesis of a relationship between the divergence in colour patterns and speciation. High functional divergence suggests a crucial influence of colour patterns in species phenotypic differentiation. Secondly, by combining our data with time-calibrated phylogenies, we confirmed a great evolvability of colour patterns in reef fishes. Finally, we revealed that a high level of colour pattern diversity was produced recently in major subclades of the three fish families.