

## Mystery of color patterns of reef fish solved

## December 5 2018



Two closely related species living together need different colors to stand out. The Reticulated Butterflyfish (Chaetodon reticulatus; left) and Meyer's Butterflyfish (Chaetodon meyeri; right) are close relatives that have overlapping ranges in the Indo-Pacific and are both found on the Great Barrier Reef. Despite only being separate species for less than a million years (a blink of an eye in evolutionary time), they have evolved very different color patterns making them stand apart from each other on reefs where they are both found. Credit: Tane Sinclair-Taylor

Scientists have solved the mystery of why some closely-related species of an iconic reef fish have vastly different colour patterns, while others



look very similar.

Innovative research led by scientists at the ARC Centre of Excellence for Coral Reef Studies based at James Cook University, examined the differences in appearance of 42 species of the butterflyfish.

They found that on reefs where closely related butterflyfish species ranges overlap, the differences in colour patterns between the two were most pronounced.

The team used high-resolution digital colour photographs to quantify colour patterns and explore how they were influenced by evolutionary processes.

"Our results show that, over millions of years, butterflyfishes have evolved the greatest diversity of visual markings when they live in the same area as other, closely <u>related species</u>," said lead author and Ph.D. student Christopher Hemingson.

"Crucially, we also found that this only happens when both species have ranges that are of similar sizes," said Mr Hemingson.

"We were surprised to find that when one species' range is a lot larger than the neighbouring species, the <u>pattern</u> is reversed—with the colour pattern of overlapping species found to be less different," said co-author Dr. Peter Cowman.

Professor David Bellwood, a co-author and senior investigator, noted that this is the first time geographic range dynamics have been shown to be an important predictor of colour differences among marine fish species.

"This research is the first of its kind to quantify colour and pattern



differences simultaneously among butterflyfish species. It showed us that <u>colour</u> pattern differences can evolve very quickly among species (within 300,000 years) but then remain stable over millions of years," said Professor Bellwood.

"Colour is far more complicated than just looking different from other species," said Mr Hemingson.

"These <u>colour patterns</u> also depend specifically on what other species are also present. It is an interesting piece to the puzzle and may help explain why reef fishes are so colourful."

The paper "Colour pattern divergence in <u>reef</u> fish <u>species</u> is rapid and driven by both range overlap and symmetry" is published in the journal *Ecology Letters*.

**More information:** Christopher R. Hemingson et al, Colour pattern divergence in reef fish species is rapid and driven by both range overlap and symmetry, *Ecology Letters* (2018). DOI: 10.1111/ele.13180

## Provided by ARC Centre of Excellence in Coral Reef Studies

Citation: Mystery of color patterns of reef fish solved (2018, December 5) retrieved 10 May 2024 from <u>https://phys.org/news/2018-12-mystery-patterns-reef-fish.html</u>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.