Remote marine protected area reveals unusual social behaviour in *Chaetodon trifascialis*

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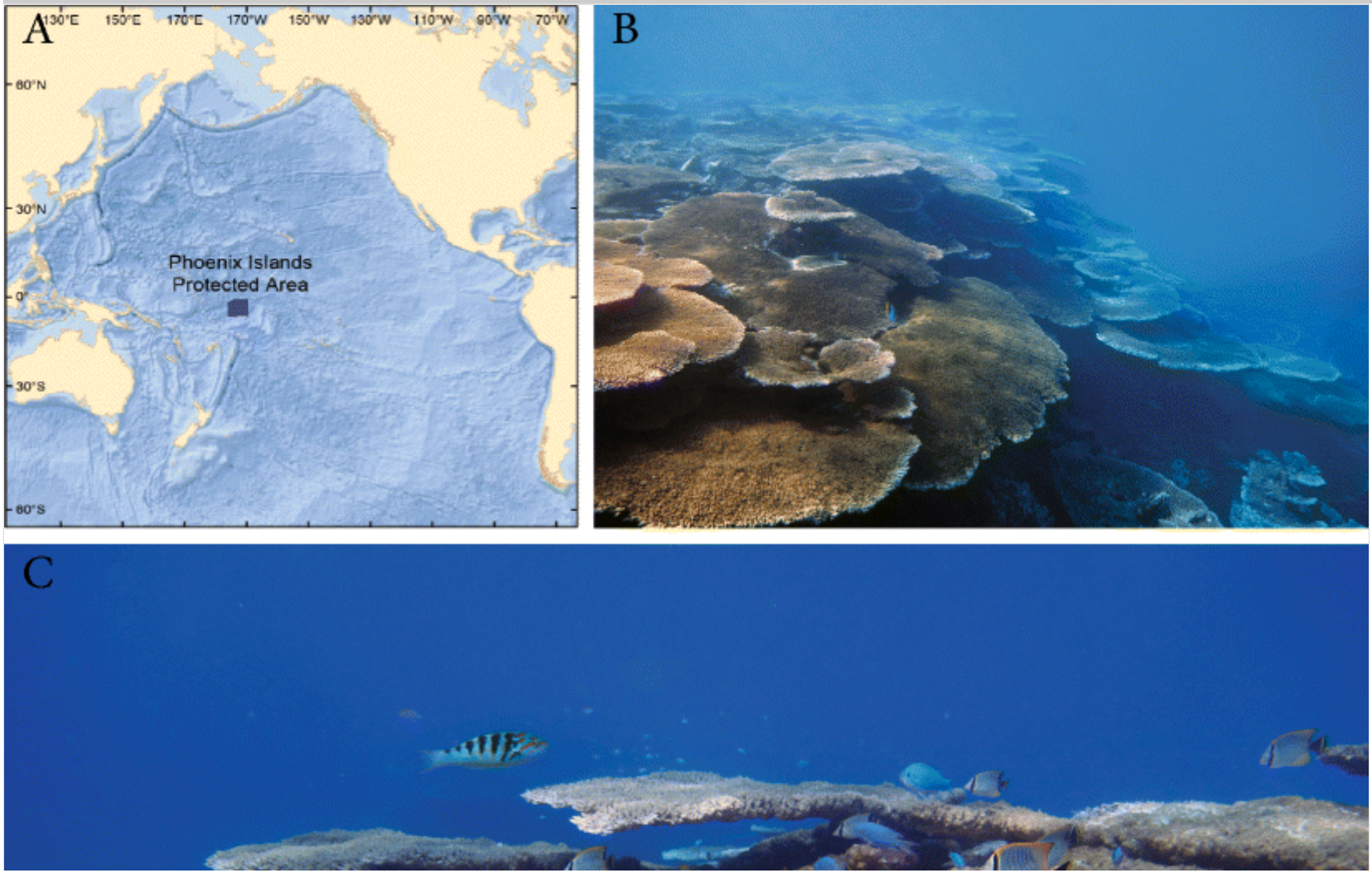
Communicated by R. Serrao Santos

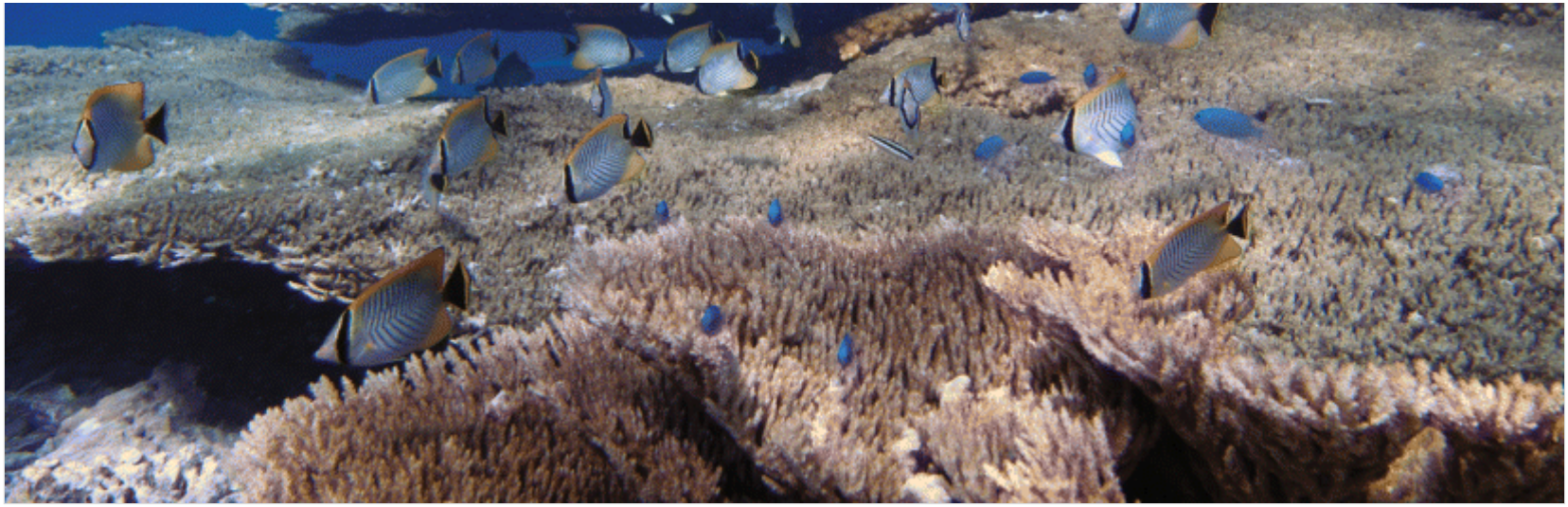
Phoenix Islands Protected Area (PIPA) in the Republic of Kiribati is one of the largest marine protected areas in the world (408,250 km^2). These reefs are extremely remote (Fig. 1a) and, therefore, escape many anthropogenic impacts. While snorkelling in the shallow lagoon at Kanton Island (2°47′25″S 171°42′48″W) in September 2015, we came upon unusually

high cover (~100 %) of tabular *Acropora* (*A. hyacinthus* and/or *A. cytherea*) (Fig. 1b) and strikingly high numbers of *Chaetodon trifascialis*. Up to 25 individuals were observed coexisting within a relatively small area of ~4 m^2 (Fig. 1c). Moreover, there were additional individuals present under the coral colonies out of view. Based on size, all individuals within the group were adults or sub-adult and clearly displayed overlapping ranges with minimal conspecific aggression.

Fig. 1

a Phoenix Islands Protected Area, **b** high cover of tabular *Acropora*, **c** aggregation of *Chaetodon trifascialis*





To our knowledge, this is the first reported social aggregation of *C. trifascialis*. In stark contrast, *C. trifascialis* is currently known to be solitary and highly territorial toward same-sex conspecifics, with territories ranging from 16 to 102 m^2 and containing one male and ~3 females (Yabuta and Kawashima 1997). Solitary and territorial sociality is associated with a haremic mating system in this species (Yabuta and Kawashima 1997), possibly due to a scattered female distribution and patchy resources. In addition, *C. trifascialis* displays high dietary specialisation, feeding almost exclusively on *Acropora* (Pratchett 2007).

Although typically reported to exhibit resource and female (or harem) defence polygyny, it is possible that the surplus of essential coral cover and isolation of PIPA reefs has shifted the social structure from solitary/territorial to aggregating/non-territorial. From a cost–benefit perspective, it may no longer be economical to maintain and defend territories and mates if abundance and resources availability is high. Our observation also suggests that higher abundance levels are possible when the influences of humans are reduced.

Acknowledgements

The research expedition was funded by New England Aquarium, Woods Hole Oceanographic Institution and King Abdullah University of Science and Technology. We thank the Government of Kiribati for access to the region.

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