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Brown banded bamboo shark (*Chiloscyllium punctatum*) shows high genetic diversity and differentiation in Malaysian waters

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The demersal brown banded bamboo shark *Chiloscyllium punctatum* is a major component of sharks landed in Malaysia. However, little is known about their population structure and the effect of high fishing pressure on these weak swimming sharks. Both mitochondrial DNA control region (1072 bp) and NADH dehydrogenase subunit 2 (1044 bp) were used to elucidate the genetic structure and connectivity of *C. punctatum* among five major areas within the Sundaland region. Our findings revealed (i) strong genetic structure with little present day mixing between the major areas, (ii) high intra-population genetic diversity with unique haplotypes, (iii) significant correlation between genetic differentiation and geographical distance coupled with detectable presence of fine scale geographical barriers (i.e. the South China Sea), (iv) historical directional gene flow from the east coast of Peninsular Malaysia towards the west coast and Borneo, and (v) no detectable genetic differentiation along the coastline of east Peninsular Malaysia. Genetic patterns inferred from the mitochondrial DNA loci were consistent with the strong coastal shelf association in this species, the presence of contemporary barriers shaped by benthic features, and limited current-driven egg dispersal. Fine scale population structure of *C. punctatum* highlights the need to improve genetic understanding for fishery management and conservation of other small-sized sharks.

Sharks are generally highly vulnerable to overexploitation due to their life history strategies, such as late maturity and low fecundity[1–5]. Overexploitation has been shown to reduce genetic diversity and increase extinction risk especially for small populations[6]; therefore understanding the genetic structure and migration patterns or gene flow of shark species are essential to inform effective management and conservation plans. Earlier shark genetic studies had been largely focused on marine neritic shark species, that are charismatic, economically important and of conservation interest[5], e.g. blacktip shark *C. limbatus*[7], hammerhead shark *Sphyrna lewini*[8], whale shark *Rhincodon typus*[9] and great white shark *Carcharodon carcharias*[10–15]. Studies on small-sized benthic coastal sharks have increased in recent years in part due to their catch prominence and importance in coastal fisheries, both globally and in Southeast Asia, e.g. whitespotted bambooshark *Chiloscyllium plagiosum*[16], nurse shark *Gingly-mostoma cirratum*[17], whitetip reef shark *Triaenodon obesus*[18], leopard shark *Triakis semifasciata*[19] and common smoothhound *Mustelus mustelus*[20].

One such group of sharks is the longtail carpet shark or bamboo shark from the family Hemiscyllidae (order Orectolobiformes). The family Hemiscyllidae comprises two genera: *Hemiscyllium* Müller & Henle, 1838 (nine species) which is confined to the Australia-New Guinea region and Indonesia, and the Indo-Pacific genus of *Chiloscyllium* Müller & Henle, 1837 (eight species)[21]. These bottom-living sharks are known to be weak swimmers[22] with great camouflage ability, allowing them to adapt to demersal habitat by hiding around crevices[23].

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