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Original Article

Microsatellite-based population structure corresponding to the geographic origin of saltwater crocodiles in Sarawak River Basins

Reymathi a/p Nadarajan[1], Ruhana Hassan[1, 2], Mohd Izwan Zulaini Abdul Gani[3], and Azroie Denel[3]

[1] *Faculty of Resource Science and Technology, Universiti Malaysia Sarawak, Kota Samarahan, Sarawak, 94300 Malaysia*

[2] *Centre for Pre-University Studies, Universiti Malaysia Sarawak, Kota Samarahan, Sarawak, 94300 Malaysia*

[3] *Sarawak Forestry Corporation, Kota Sentosa, Kuching, Sarawak, 93250 Malaysia*

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Abstract

Of the recognized 24 crocodilian species, two species are found in Sarawak: the saltwater crocodile (*Crocodylus porosus*) and Malayan false gharial (*Tomistoma schlegelii*). *C. porosus* is the most commonly found crocodile and currently listed in Appendix II of the Convention on International Trading in Endangered Species of Wild Flora and Fauna (CITES), which allows harvesting wild populations for commercial purposes. To strengthen conservation efforts, ecological and genetic data are needed to inform management decisions. Thus, this study was designed to estimate relationship coefficients between crocodiles in thirteen river basins using 13 microsatellite markers. Fifty-eight wild crocodile samples were obtained and finally analysed by clustering of PCR products. Of the 60 samples amplified, one marker (Cj35) was polymorphic and showed double bands, whereas the other seven markers (Cj127, Cj131, Cj122, Cj101, Cj119, CUD68 and Cj16) revealed a single band. Microsatellite loci (Cj105, Cj18, Cj104, Cp10, and Cu4-121) displayed multiple bands. Using the unweighted pair group with the arithmetic mean (UPGMA) clustering method, an unrooted phylogenetic tree was obtained, with coefficients ranging between 0.51 and 1.00. We successfully assessed population genetic structure and resolved genetic relationships among six clades (Clade A to F) out of the total seven clades. DNA microsatellites are a promising resource for determining the relationships among crocodiles in Sarawak. The findings are useful for future sustainable utilization of the wild crocodile population.

Keywords: biodiversity, microsatellites, loci, clustering, crocodile

1. Introduction

Crocodilia is a group of usually giant, predatory semiaquatic reptiles that dwell in various aquatic environments such as rivers, marshes, swamps, forest streams, and elbow lakes. The saltwater crocodile is commonly referred to as "buaya katak" or "buaya tembaga" (translated as "frog crocodile" or "copper crocodile," respectively) by the locals in Sarawak (Abdul Gani, 2019). The species has a huge head, and a pair of ridges run from the eye along the middle of the snout. They are found in over 90 nations and islands worldwide (Martin, 2008). Sarawak is habitat to just two species of crocodiles: the Malayan false gharial (*Tomistoma schlegellii*) and the saltwater crocodile (*Crocodylus porosus*) (Hassan *et al*., 2016, 2018).

C. porosus can be found in nearly all of Sarawak's river basins and is frequently involved in human-crocodile conflicts (Abdul Gani, 2019; Tisen & Ahmad, 2010). All crocodilians are heavily impacted, either directly or indirectly, by anthropogenic causes, which are the main factor. In response

*Corresponding author
Email address: reymathi23@yahoo.com