

Mitochondrial Genome of *Rattus tiomanicus* (Rodentia: Muridae) and Molecular Phylogeny of Murinae

(Genom Mitokondria *Rattus tiomanicus* (Rodentia: Muridae) dan Filogeni Molekul Murinae)

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ABSTRACT

Rattus tiomanicus is a murid rodent of considerable agricultural and public health importance in Southeast Asia. The whole mitochondrial genome of *R. tiomanicus* was sequenced by the Ion Torrent PGM platform. It had a total length of 16,309 bp, consisting of 13 protein-coding genes, two rRNA genes, 22 tRNA genes and two non-coding regions (L-strand replication origin and control region). Only TAA and incomplete T-stop codons were represented in the protein-coding genes. Of the tRNAs, tryptophan (W) had ACU anticodon. The cloverleaf structure for serine S1 (AGN) tRNA lacked the entire D-arm, while in lysine (K) tRNA, the DHU arm lacked the D-loop. Molecular phylogeny based on 15 mt-genes indicated *R. tiomanicus* having closest genetic affinity to *R. rattus* complex (*R. rattus*, *R. tanezumi*). There were two major clades for the Murinae subfamily namely the Rattini tribe and the Apodemini, Murini and Hydromyini tribes. The whole mitogenome of *R. tiomanicus* will serve as a useful dataset for studying the systematics and phylogenetic relationships of the murid rodents.

Keywords: Genomics; Murinae; phylogenetics

ABSTRAK

Rattus tiomanicus ialah tikus murid yang penting dalam bidang kesihatan dan pertanian di Asia Tenggara. Seluruh genom mitokondria *R. tiomanicus* telah diujuk oleh platform Ion Torrent PGM. Ia mempunyai jumlah panjang 16,309 bp, terdiri daripada 13 gen yang mengekod protein, dua gen rRNA, 22 gen tRNA dan dua kawasan bukan pengekodan (origin replikasi bebenang L dan kawasan pengawalan). Hanya TAA dan kodon penamat tidak lengkap T berada dalam gen yang mengekod protein. Bagi gen tRNA, triptofan (W) mempunyai antikodon ACU. Struktur kelawar bagi tRNA serina S1 (AGN) kekurangan keseluruhan lengan-D, manakala lengan DHU dalam tRNA lisina (K) kekurangan gelung-D. Filogeni molekul berdasarkan gen-mt 15 menunjukkan *R. tiomanicus* mempunyai pertalian genetik yang paling dekat dengan *R. rattus* kompleks (*R. rattus*, *R. tanezumi*). Dua klad utama untuk subfamili Murinae adalah untuk suku Rattini dan suku Apodemini, Murini serta Hydromyini. Keseluruhan mitogenom *R. tiomanicus* adalah bermanfaat untuk memberikan set data dalam mengkaji hubungan sistematik dan filogenetik bagi tikus murid.

Kata kunci: Filogenetik; genom; Murinae

INTRODUCTION

Rattus tiomanicus is a murid rodent of considerable economic and public health importance, as a pest and carrier of disease pathogens, in Southeast Asia. It is a definitive host of the nematode parasites *Angiostrongylus cantonensis* (Yong & Eamsobhana 2013), *A. malaysiensis* (Eamsobhana 2014) and *Breinlia tinjili* (Purnomo & Bangs 1996) among others.

The Malaysian field rat *R. tiomanicus* is found in Thailand, Malaysia, Brunei, Indonesia and the

Philippines (Musser & Carleton 2005), excluding the contentious report of transsundaic distribution (Balakirev & Rozhnov 2012; Robins et al. 2014). The type locality is Tioman Island, off the east coast of Peninsular Malaysia. It is represented by many subspecies, both in the mainland as well as the offshore islands. It is a serious pest of plantation crops in Southeast Asia (Buckle et al. 1997).

The karyotype of *R. tiomanicus* from Tioman Island is identical to the mainland *R. t. jalorensis* (Yong et al. 1972). It is distinct from the closely related