

GENETIC DIVERSITY OF BACTERIA ISOLATED FROM KOI  
AND GOLDFISH ANALYSED BY RAPD-PCR TECHNIQUE

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**GENETIC DIVERSITY OF BACTERIA ISOLATED FROM KOI AND GOLDFISH  
ANALYSED BY RAPD-PCR TECHNIQUE**

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## ABSTRACT

Koi (*Cyprinus carpio*) and goldfish (*Carassius auratus*) are famous and intensively reared in aquarium fish industry. The random amplified polymorphic DNA (RAPD) method based on polymerase chain reaction (PCR) was used to analyse the genetic diversity of twelve bacteria strains isolated from koi and goldfish: seven *Aeromonas hydrophila* strains (1K to 6K, 1G); two *Enterobacter sakazakii* strains (7K, 2G); one *Vibrio cholerae* strain (8K) and two *Flavimonas oryzihabitans* strains (9K, 10K). Reproducible profiles of genomic DNA fingerprints were generated by RAPD-PCR using a universal primer, 5'-GTGGTGGTGGTGGTG-3'. RAPD data were analysed using NTSYSpc package, version 2.1. Similarities were computed using the Jaccard's coefficient and strains were clustered by the unweighted pair group method using arithmetic averages (UPGMA) in order to present the results in the form of dendrogram. The present study showed that the RAPD profile of the *Flavimonas oryzihabitans* strains (9K, 10K) was identical. Conversely, RAPD profiles of the *Aeromonas hydrophila* strains (1K to 6K and 1G) and *Enterobacter sakazakii* strains (2G, 7K) differed between isolates. These findings reveal genomic homogeneity in *Flavimonas oryzihabitans* isolates and genetic variety in *Aeromonas hydrophila* and *Enterobacter sakazakii* strains. The results obtained in this study clearly indicate that strains that belong to the same origin are not always closely related genetically.

## ABSTRAK

Koi (*Cyprinus carpio*) dan ikan emas (*Carassius auratus*) adalah ikan hiasan yang terkenal dan dipelihara secara intensif dalam industri ikan akuarium. Amplifikasi secara rawak DNA polimorfik (RAPD) berdasarkan jujukan rantai polimerase (PCR) telah digunakan untuk menganalisis kepelbagaian genetik bagi dua belas strain bakteria yang dipencilkan daripada koi dan ikan emas: tujuh strain *Aeromonas hydrophila* (1K to 6K, 1G); dua strain *Enterobacter sakazakii* (7K, 2G); satu strain *Vibrio cholerae* (8K) dan dua strain *Flavimonas oryzihabitans* (9K, 10K). Profil penyalinan RAPD-PCR genomik DNA telah dijanakan dengan menggunakan universal primer, 5'-GTGGTGGTGGTGGTG-3'. Data RAPD telah dianalisis dengan menggunakan pakej NTSYSpc, version 2.1. Kesamaan genetik bakteria dianalisis oleh Jaccard coefficient dan data dikumpulkan berdasarkan UPGMA (unweighted pair group method using arithmetic averages) untuk membina dendrogram. Kajian ini menunjukkan bahawa profil RAPD untuk *Flavimonas oryzihabitans* (9K, 10K) adalah serupa. Manakala, profile RAPD untuk *Aeromonas hydrophila* (1K to 6K and 1G) dan *Enterobacter sakazakii* (2G, 7K) adalah berbeza di antara isolat. Keputusan ini menunjukkan kesamaan genomik pada isolat-isolat *Flavimonas oryzihabitans* dan kepelbagaian genetik pada strain *Aeromonas hydrophila* dan *Enterobacter sakazakii*. Keputusan yang didapati dalam kajian ini jelas menunjukkan bahawa strain-strain daripada asal-usul yang sama tidak semestinya mempunyai genetik yang berhubung rapat.