

The Malaysian Human Genome Variation Project

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Introduction

Malaysia is a multi cultural, multi religious and multi ethnic country comprising of numerous ethnic groups. Malays form the major ethnic group and can be further subdivided into various sub-groups. The genome wide mapping of these ethnic groups for the creation of genetic database will provide the genetic map of the country migration history and uncover the extent of genetic similarity between the various populations along with the study of common diseases in the Malaysian populations.

Methodology

The SNP multilocus genotype data of the Malay subethnic groups were obtained through the use of the Affymetrix 50K microarray chips and were analysed together with those of 12 other populations from Thailand, Indonesia, China, India, Africa and Orang Asli sub groups in Peninsula Malaysia obtained from the Pan-Asian SNP (PASNP) database. Phylogenetic analyses of all 54,794 autosomal SNPs were implemented by Neighbor Joining algorithm. Bayesian clustering procedure using STRUCTURE software was performed to examine the ancestry of all 472 individuals.

Results

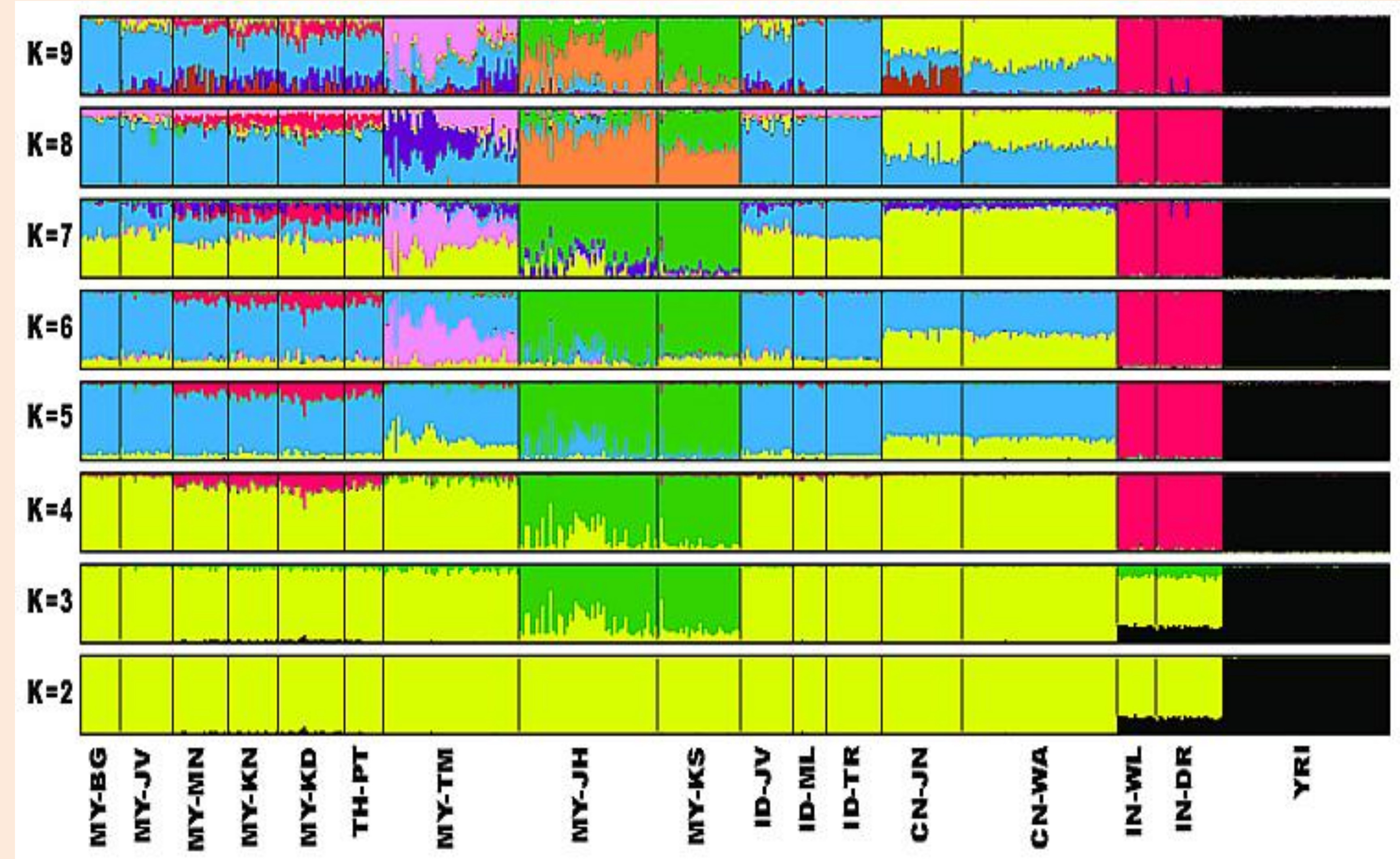
The phylogenetic analyses showed the Malay sub ethnic groups are separated into at least 3 different clusters. The Jawa, Bugis and Minang have a very close genetic relationship with Indonesian populations indicating a common ancestral origin, while the Kelantan and Kedah formed a distinct group on the tree indicating that they are genetically different from the other Malay sub ethnic groups. From our results, we could also conclude that while the Malays belong to the Southern Mongoloid group of races, there are evidence of gene flow from the Indians to Malays.

Conclusion

Our results have provided information on the genetic differentiation between the sub ethnic groups and valuable insight into the origin of the Malay sub ethnic groups in peninsula Malaysia. The created database on these populations will complement the HapMap database and contribute valuable information on the genetic background of the South-East Asian population.

Acknowledgements

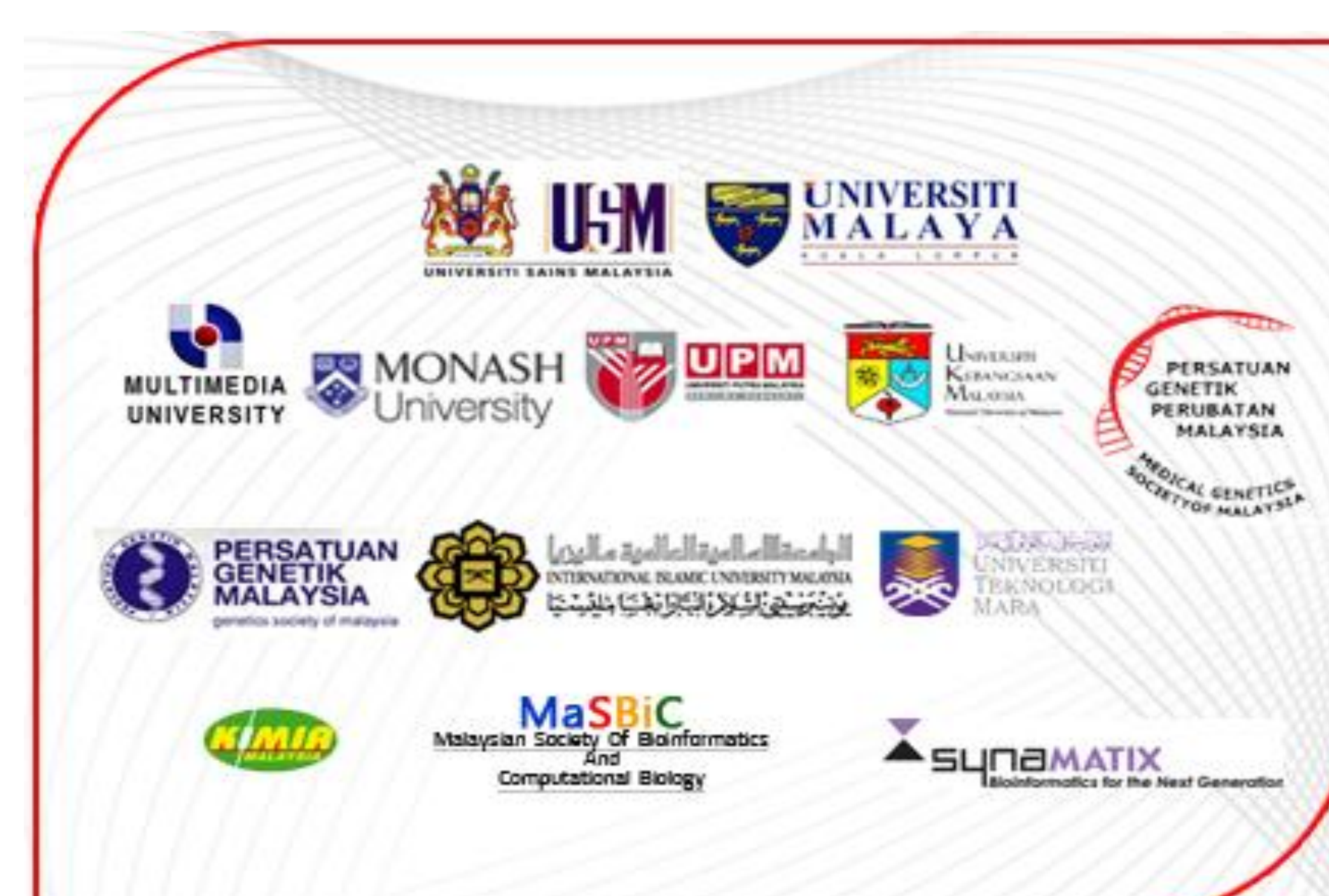
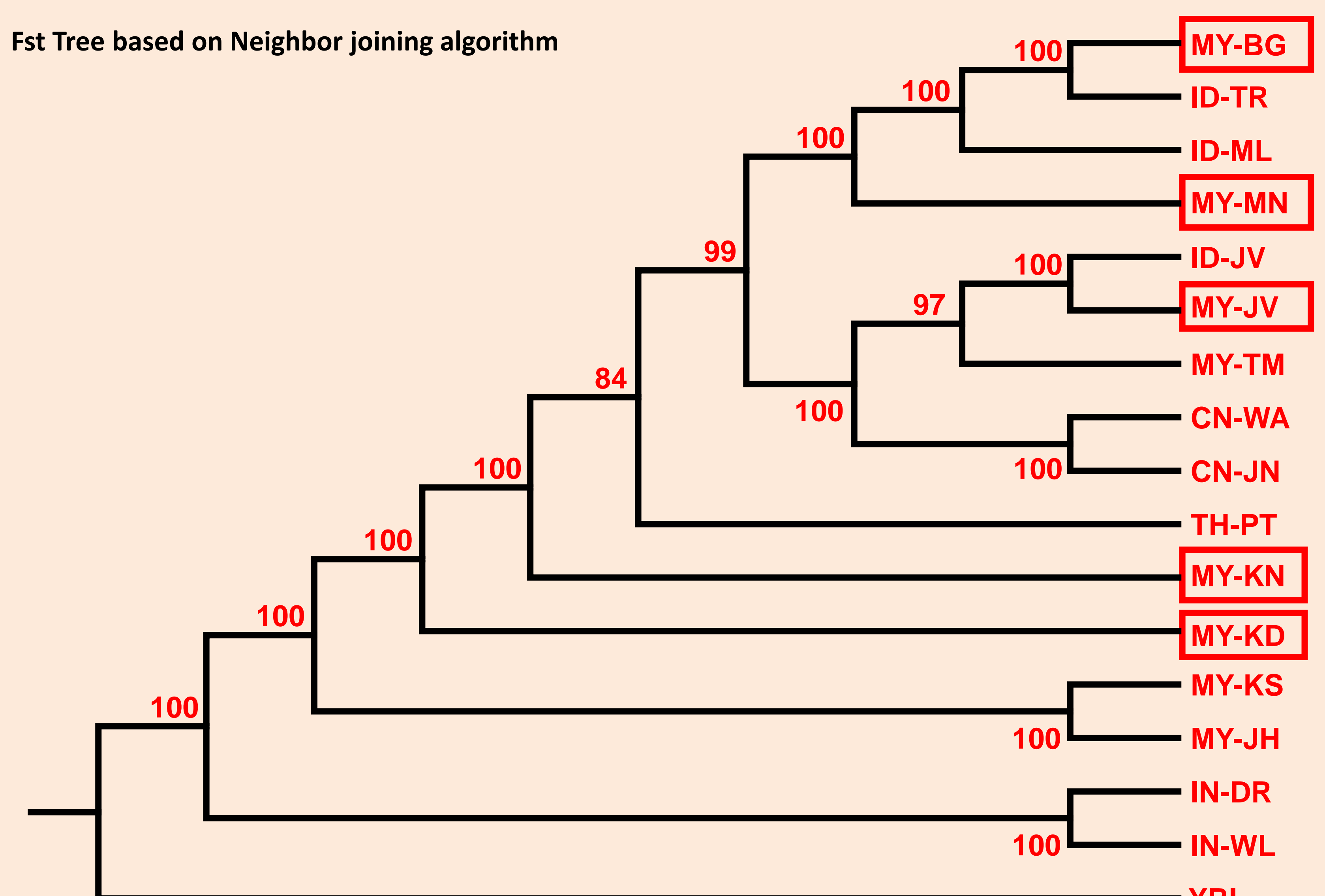
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Proportion of membership coefficient (Q) of each pre-defined population in each of the 6 clusters from STRUCTURE.

| COUNTRY & POPULATION (NO. OF SUBJECTS) | SAMPLE ID | CLUSTER (K) | | | | | |
|--|-----------|----------------------|---------------|---------------|---------------|---------------|---------------|
| | | MALAYS & INDONESIANS | INDIANS | CHINESE | AFRICAN | NEGRITOS | PROTO-MALAYS |
| MALAYS: | | | | | | | |
| JAWA (19) | MY-JV | 0.7954 | 0.0094 | 0.1444 | 0.0006 | 0.0164 | 0.0338 |
| BUGIS (14) | MY-BG | 0.8605 | 0.0086 | 0.1137 | 0.001 | 0.0064 | 0.0098 |
| MINANG (20) | MY-MN | 0.7558 | 0.1202 | 0.0948 | 0.002 | 0.0114 | 0.0158 |
| KELANTAN (18) | MY-KN | 0.6701 | 0.1546 | 0.1133 | 0.002 | 0.0226 | 0.0374 |
| KEDAH (24) | MY-KD | 0.6454 | 0.2108 | 0.1033 | 0.0016 | 0.0142 | 0.0246 |
| PROTO-MALAY*: | | | | | | | |
| TEMUAN (49) | MY-TM | 0.3922 | 0.0086 | 0.0724 | 0.0008 | 0.0222 | 0.5038 |
| NEGRITOS*: | | | | | | | |
| JAHAI (50) | MY-JH | 0.1157 | 0.0028 | 0.0554 | 0.0006 | 0.8094 | 0.0162 |
| KENSUI (30) | MY-KS | 0.0312 | 0.013 | 0.1269 | 0.0006 | 0.8181 | 0.0102 |
| THAILAND: | | | | | | | |
| TH-PT (14) | TH-PT | 0.7093 | 0.1401 | 0.0991 | 0.0014 | 0.0188 | 0.0314 |
| INDONESIA*: | | | | | | | |
| JAVA: | | | | | | | |
| JAWA (19) | ID-JV | 0.7845 | 0.0074 | 0.1555 | 0.001 | 0.017 | 0.0346 |
| SUMATRA: | | | | | | | |
| MELAYU (12) | ID-ML | 0.8567 | 0.0198 | 0.1095 | 0.0022 | 0.006 | 0.0058 |
| SULAWESI: | | | | | | | |
| TORAJA (20) | ID-TR | 0.8736 | 0.0074 | 0.11 | 0.0008 | 0.005 | 0.0032 |
| CHINA*: | | | | | | | |
| JINUO (29) | CN-JN | 0.5173 | 0.003 | 0.4699 | 0.0006 | 0.0044 | 0.0048 |
| WA (56) | CN-WA | 0.5486 | 0.004 | 0.4284 | 0.001 | 0.0074 | 0.0106 |
| INDIA*: | | | | | | | |
| LANGUAGE: | | | | | | | |
| MARATHI (14) | IN-WL | 0.0058 | 0.9772 | 0.0042 | 0.0048 | 0.0044 | 0.0036 |
| TELUGU (24) | IN-DR | 0.0062 | 0.9774 | 0.0042 | 0.0036 | 0.0056 | 0.003 |
| AFRICA*: | | | | | | | |
| YORUBA (60) | YRI | 0.0016 | 0.0028 | 0.0018 | 0.9902 | 0.002 | 0.0016 |

Fst Tree based on Neighbor joining algorithm



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