

Development of a High-Density Feline Microarray for Breed and Trait Identification

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ABSTRACT

Feline genetics plays a vital role in research and veterinary care, providing essential insights into breed identification and trait prediction that enhance our understanding of feline health and well-being. Due to their high-throughput and unparalleled genomic coverage, high-density microarrays are widely used for SNP genotyping. With these arrays, researchers can test thousands of samples across tens of thousands of SNPs simultaneously, in a simple high-throughput workflow. In our effort to develop an Axiom™ high-density microarray, over 2,000,000 markers were screened across over 2,000 samples encompassing purebred and random-bred cats. Over 650,000 polymorphic markers, representing optimal genomic coverage and trait identification, have been selected for a single high-density microarray. Given the relatively low linkage disequilibrium, such a densely populated genotyping array is important for conducting robust complex disease association studies.

The high-density Axiom™ Feline DNA microarray includes functional SNPs, insertion/deletions, and CNV regions of biological relevance, breed-specific markers, and over 125 variants associated with specific diseases and traits, including the markers on the AgriSeq™ Feline Parentage and ID Plus Traits and Disorders Panel. The Axiom™ microarray’s applications include genome-wide association studies, disease mapping, veterinary investigation, direct-to-consumer utilization, and model organism research.

The microarray's dense genomic coverage facilitates accurate imputation to the whole genome, improving the precision of association studies and enabling the development of personalized healthcare plans for cats. The Axiom™ Feline microarray is a comprehensive solution for high-density, high-throughput feline genotyping. This microarray is expected to be a powerful tool to help create a healthier future for cats.

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INTRODUCTION

The Applied Biosystems Axiom Feline HD Array is the most comprehensive feline array available on the Axiom genotyping platform. Featuring over 650,000 polymorphic markers, it has been designed to optimize genomic coverage across a worldwide diversity of breeds as well as random-bred cats.

Figure 1. High sample throughput. The Applied Biosystems Axiom Feline HD Array is available in a 96-array plate format.



RESULTS

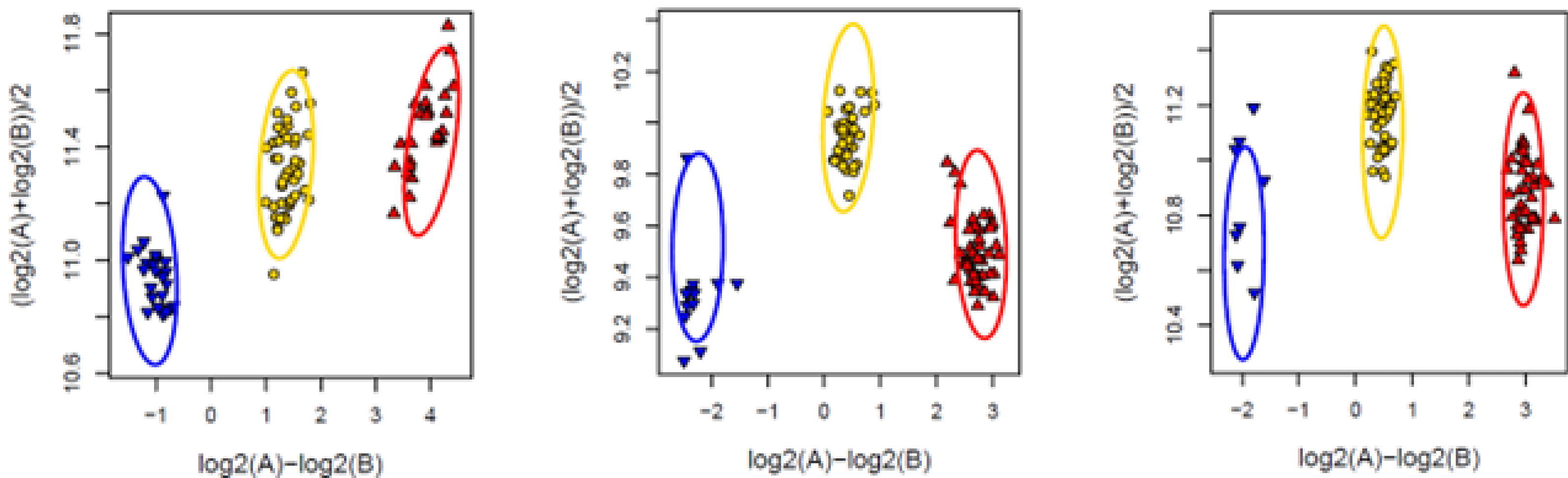
Table 1. Examples of associated traits, diseases, and populations.

11Beta-Hydroxylase Deficiency	Congenital Erythropoietic Porphyria	Hyperoxaluria Type II	Niemann-Pick C2 Disease
AB Blood Type	Copper Metabolism	Hypertrophic Cardiomyopathy	Polycystic Kidney Disease
Agouti Banded Hair	Craniofacial	Hypogonadotropic Hypogonadism	Polydactyly
Amyloidosis	Dihydropyrimidinase Deficiency	Hypokalemia	Progressive Retinal Atrophy
Chediak-Higashi Syndrome	Ehlers-Danlos Syndrome	Inflammatory Linear Verrucous Epidermal Nevi	Rexing
Chondrodysplasia	Factor XII Deficiency	Japanese Bobtail	Scottish Fold
CMAH Blood Group ABC	Feet, White, Gloving	Lipoprotein Lipase Deficiency	Sex
Coat Color	Fibrodysplasia Ossificans Progressiva	Longhair	Spinal Muscular Atrophy
Coat Color, Brown	Gangliosidosis 2	Manx	Tabby
Coat Color, Dilute	Glycogen Storage Disease IV	Mucopolysaccharidosis type VI	Vitamin D Resistant Rickets
Coat Color, Extension	Hair Morphology, Glitter	Mucopolysaccharidosis type VII	Vitamin D-Dependent Rickets Type 1A
Coat Color, Orange	Hemophilia B	Niemann-Pick C1 Disease	Vitamin D-Dependent Rickets Type 1B

Table 2. List of marker applications, sources, and categories.

Genomic Coverage	Chromosome Y	Large Variants	Lyons Cat ancestry markers
Public Legacy Markers	mtDNA/wildcat diagnostic	Trait Associated	ISAG parentage markers
Protein Coding	Leopard and Bengal markers	Disease Associated	European Wildcat

Figure 2. Sample Parentage SNP Cluster Plots.



CONCLUSION

The Applied Biosystems Axiom Feline HD Array is a high-density, high-throughput tool designed to provide comprehensive coverage for applications such as GWAS, biomedical model research, and veterinary healthcare.

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