

Table S5: Gene Ontology terms for candidate genes under diversifying selection between pure-breed dogs and FBDs. The genes were identified based on proximity to outlier SNPs identified in a BAYESCAN analysis for: (A) East Asian (EA) breeds vs FBDs. (B) Modern European (ME) breeds vs FBDs. For (B), 60 outlier loci were identified, but only 20 loci with lowest q-values (<0.005) are listed here. (C) East Asian vs European breeds.

Terms related to reproduction, behaviour, nervous system, digestion and metabolism, and development, are marked in bold.

**A**

SNP ID	chr	located within gene	Gene symbol	Outlier in other comparisons	GO categories	GO terms
BICF2G630842219	16	yes; exon	PKD1L1	MB vs FBD	Biological Processes Cellular Component	cell-cell adhesion integral component of membrane
BICF2S23454833	16	no	PKD1L1	MB vs FBD	Biological Processes Cellular Component	cell-cell adhesion integral component of membrane
BICF2G630842234	16	yes; intron	PKD1L1	MB vs FBD	Biological Processes Cellular Component	cell-cell adhesion integral component of membrane
TIGRP2P367127_rs8543245	29	no	MMP16	MB vs FBD	Biological Processes	<b>collagen catabolic process; multicellular organismal protein metabolic process; multicellular organismal protein catabolic process; protein digestion</b> integral component of plasma membrane; extracellular region part
TIGRP2P369635_rs8651736	36	yes; intron	MARCH7	MB vs FBD	Cellular Component Biological Processes	ubiquitin cycle
BICF2S23653049	21	yes; exon	CALCB	MB vs FBD	Molecular Function Biological Processes	protein binding; zinc ion binding; ligase activity <b>regulation of neurological system process; neuropeptide signaling pathway; behaviour; feeding behaviour; multicellular organismal development; organ development; anatomical structure morphogenesis; skeletal system development; regulation of ossification; biomineral tissue development; positive regulation of bone remodeling;</b> vasodilation of artery involved in baroreceptor response to increased systemic arterial blood pressure; regulation of smooth muscle contraction; regulation of heart rate; regulation of systemic arterial blood pressure by baroreceptor feedback; baroreceptor response to increased vasodilation of artery; baroreceptor response to increased systemic arterial blood pressure; vascular process in circulatory system; tube morphogenesis; inflammatory response; cAMP-mediated signaling; positive regulation of hydrolase activity; positive regulation of lyase activity; positive regulation of adenylate cyclase activity; activation of phospholipase C activity; regulation of blood vessel size; vasodilation; positive regulation of cytosolic calcium ion concentration; homeostatic process; cell-cell signaling; response to external stimulus; response to heat; detection of temperature stimulus involved in sensory perception of pain; response to pain; multicellular organismal response to stress; regulation of biological quality; regulation of biological process
					Molecular Function	<b>dopamine neurotransmitter receptor activity; hormone activity;</b> calcitonin receptor

BICF2P1363919	31	no	V1R homo- logue	MB vs FBD	Cellular Component Biological Processes Molecular Function	binding; G-protein coupled receptor signaling pathway; negative regulation of transcription <b>axon part; neuronal cell body; neuron projection; terminal bouton;</b> endoplasmic reticulum; extracellular space; nucleus; cell projection; soluble fraction <b>response to pheromone pheromone receptor activity;</b> transmembrane receptor activity; rhodopsin-like receptor activity; G-protein coupled receptor signaling pathway; cell surface receptor linked signal transduction
TIGRP2P97765_rs8 917688	7	no	SETBP1	MB vs FBD	Cellular Component Molecular Function	integral to membrane; plasma membrane; cell part DNA binding; protein binding
BICF2G630509420; rs23187455	24	yes; intron	MKKS	EA vs MB	Cellular Component Biological Processes	cell part; nucleus <b>behaviour; multi-organism behavior; social behavior; development of primary sexual characteristics; developmental process involved in reproduction; sex differentiation; reproductive structure development; gonad development; spermatid development; spermatid differentiation; anatomical structure morphogenesis; organ development;</b> heart development; nonmotile primary cilium assembly; flagellum assembly; flagellum organization; cell projection assembly; detection of abiotic stimulus; detection of mechanical stimulus involved in sensory perception of sound; photoreceptor cell maintenance; response to mechanical stimulus; response to abiotic stimulus; homeostatic process; cellular homeostasis; regulation of biological quality <b>dopamine neurotransmitter receptor activity sperm motility; negative regulation of flagellar cell motility; positive regulation of carbohydrate metabolic process; regulation of catabolic process; positive regulation of glycolytic process</b>
BICF2G630662694	13	no	GAPDHS homo- logue	EA vs MB	Molecular Function Biological Processes Molecular Function	glyceraldehyde-3-phosphate dehydrogenase (NAD+) (phosphorylating) activity; oxidoreductase activity; NAD binding
BICF2G630560144; rs24457899	7	yes; intron	NOL4	EA vs MB	Cellular Component Molecular Function	cell projection; flagellum RNA binding
BICF2P1348247; rs8579426	18	yes; intron	ATXN7L1	EA vs MB	Cellular Component -	nucleus; nucleolus -

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**B**

SNP ID	chr	located within gene	Gene symbol	Outlier in other comparisons	GO categories	GO terms
TIGRP2P369635_rs 8651736	36	yes; intron	MARCH7	EA vs FBD	Biological Processes Molecular Function	ubiquitin cycle protein binding; zinc ion binding; ligase activity
BICF2P1363919	31	no	V1R homologue	EA vs FBD	Biological Processes Molecular Function	<b>response to pheromone</b> <b>pheromone receptor activity</b> ; transmembrane receptor activity; rhodopsin-like receptor activity; G-protein coupled receptor signaling pathway; cell surface receptor linked signal transduction
BICF2S23454833	16	no	PKD1L1	EA vs FBD	Cellular Component Biological Processes	integral component of membrane; plasma membrane; cell part cell-cell adhesion
BICF2G630842219	16	yes; exon	PKD1L1	EA vs FBD	Cellular Component Biological Processes	integral component of membrane cell-cell adhesion
BICF2G630842234	16	yes; intron	PKD1L1	EA vs FBD	Cellular Component Biological Processes	integral component of membrane cell-cell adhesion
TIGRP2P367127_rs 8543245	29	no	MMP16	EA vs FBD	Cellular Component Biological Processes	integral component of membrane <b>collagen catabolic process</b> ; <b>multicellular organismal protein metabolic process</b> ; <b>multicellular organismal protein catabolic process</b> ; <b>protein digestion</b>
BICF2S23653049	21	yes; exon	CALCB	EA vs FBD	Cellular Component Biological Processes	integral component of plasma membrane; extracellular region part <b>regulation of neurological system process</b> ; <b>neuropeptide signaling pathway</b> ; <b>behaviour</b> ; <b>feeding behaviour</b> ; <b>multicellular organismal development</b> ; <b>organ development</b> ; <b>anatomical structure morphogenesis</b> ; <b>skeletal system development</b> ; <b>regulation of ossification</b> ; <b>biomineral tissue development</b> ; <b>positive regulation of bone remodeling</b> ; vasodilation of artery involved in baroreceptor response to increased systemic arterial blood pressure; regulation of smooth muscle contraction; regulation of heart rate; regulation of systemic arterial blood pressure by baroreceptor feedback; baroreceptor response to increased vasodilation of artery; baroreceptor response to increased systemic arterial blood pressure; vascular process in circulatory system; tube morphogenesis; inflammatory response; cAMP-mediated signaling; positive regulation of hydrolase activity; positive regulation of lyase activity; positive regulation of adenylate cyclase activity; activation of phospholipase C activity; regulation of blood vessel size; vasodilation; positive regulation of cytosolic calcium ion concentration; homeostatic process; cell-cell signaling; response to external stimulus; response to heat; detection of temperature stimulus involved in sensory perception of pain; response to pain; multicellular organismal response to stress; regulation of biological quality; regulation of biological process
					Molecular Function	<b>dopamine neurotransmitter receptor activity</b> ; <b>hormone activity</b> ; calcitonin receptor binding; G-protein coupled receptor signaling pathway; negative regulation of transcription
					Cellular Component	<b>axon part</b> ; <b>neuronal cell body</b> ; <b>neuron projection</b> ; <b>terminal bouton</b> ; endoplasmic

TIGRP2P97765_rs8 917688	7	no	SETBP1	EA vs FBD	Molecular Function	reticulum; extracellular space; nucleus; cell projection; soluble fraction
BICF2P1103910	3	no	ADRA2C	no	Cellular Component	DNA binding; protein binding cell part; nucleus
BICF2S23056947	11	no	CYLC2	no	Biological Processes	<b>behaviour</b> <b>alpha2-adrenergic receptor activity</b>
TIGRP2P326458_rs 9245895	25	no	DNMT3A	no	Cellular Component	integral component of membrane; plasma membrane
TIGRP2P197019_rs 8772369	15	yes	OR1B1 (human) homolog	no	Biological Processes	<b>multicellular organismal development; spermatogenesis;</b> cell differentiation
BICF2P40264	31	yes	SH3BGR homolog	no	Cellular Component	cell part; structural constituent of cytoskeleton; cytoplasm
BICF2S22912847	10	no	HNRNPA1 homolog uncharac- terised in dog	no	Biological Processes	<b>methytransferase activity</b>
BICF2S2298493	19	no	INHBB	no	Molecular Function	<b>sensory perception of smell; response to stimulus; signal transduction;</b> G-protein coupled receptor protein signaling pathway
BICF2P886804; rs8850580	24	yes; intron	POFUT1	no	Cellular Component	<b>olfactory receptor activity</b> integral component of membrane; plasma membrane
BICF2P262082	19	no	PCDH18	no	Cellular Component	signal transducer activity; protein complex assembly; SH3/SH2 adaptor activity
BICF2P433473	19	no	PCDH18	no	Cellular Component	cell part; cytoplasm
BICF2S23651627	10	no	LLPH	no	Molecular Function	nucleotide binding; nuclear mRNA splicing; single-stranded DNA binding; RNA binding; RNA splicing; protein binding; RNA export from nucleus; mRNA transport, nuclear import
BICF2P1396496	1	no	MC2R	no	Molecular Function	cell part; nucleus; nucleoplasm; spliceosome; cytoplasm; heterogeneous nuclear ribonucleoprotein complex
					Biological Process	<b>hormone activity; regulation of gonadotropin secretion; regulation of follicle- stimulating hormone secretion; multicellular organismal development; ovarian follicle development; growth factor activity; negative regulation of hepatocyte growth factor biosynthetic process; growth;</b> cytokine activity; defense response; cell differentiation; response to external stimulus; system development
					Cellular Component	host cell surface receptor binding; protein homodimerization activity extracellular region
					Biological Process	<b>multicellular organismal development; embryonic development; carbohydrate metabolic process; monosaccharide metabolic process; hexose metabolic process; fucose metabolic process</b>
					Molecular Function	cell surface receptor linked signal transduction; notch signalling pathway; peptide-O- fucosyltransferase activity; O-glycan processing; transferase activity; manganese ion binding; regulation of transcription;
					Cellular Component	integral to Golgi membrane; cell part; endoplasmic reticulum
					-	-
					-	-
					-	-
					Molecular Function	<b>adrenocorticotropin receptor activity;</b> rhodopsin-like receptor activity; transmembrane receptor activity; G-protein coupled receptor protein signaling pathway; G-protein signaling, coupled to cyclic nucleotide second messenger; cell-surface receptor linked signal transduction
					Cellular Component	cell part; integral to plasma membrane

## C

SNP ID	chr	located within gene	Gene symbol	Outlier in other comparisons	GO categories	GO terms
BICF2G630133149; rs23978953	37	yes; intron	EPHA4	MB vs FBD	Molecular Function  Cellular Component	nucleotide binding; ATP binding; protein amino acid phosphorylation; transferase activity; transmembrane receptor activity; transmembrane receptor protein tyrosine kinase signaling pathway; cell surface receptor linked signal transduction; ephrin receptor activity cell part; extracellular region; integral component of membrane; plasma membrane
BICF2P1348247; rs8579426	18	yes; intron	ATXN7L1	EA vs FBD	-	-
BICF2G630560144; rs24457899	7	yes; intron	NOL4	EA vs FBD	Biological Processes Cellular Component	RNA binding nucleus; nucleolus
BICF2G630662694	13	no	GAPDHS homo- logue	EA vs FBD	Biological Processes  Molecular Function	<b>sperm motility; negative regulation of flagellar cell motility; positive regulation of carbohydrate metabolic process; regulation of catabolic process; positive regulation of glycolytic process</b> glyceraldehyde-3-phosphate dehydrogenase (NAD+) (phosphorylating) activity; oxidoreductase activity; NAD binding
BICF2G630509420; rs23187455	24	yes; intron	MKKS	EA vs FBD	Cellular Component Biological Processes	cell projection; flagellum <b>behaviour; multi-organism behavior; social behavior; development of primary sexual characteristics; developmental process involved in reproduction; sex differentiation; reproductive structure development; gonad development; spermatid development; spermatid differentiation; anatomical structure morphogenesis; organ development;</b> heart development; nonmotile primary cilium assembly; flagellum assembly; flagellum organization; cell projection assembly; detection of abiotic stimulus; detection of mechanical stimulus involved in sensory perception of sound; photoreceptor cell maintenance; response to mechanical stimulus; response to abiotic stimulus; homeostatic process; cellular homeostasis; regulation of biological quality <b>dopamine neurotransmitter receptor activity</b>
BICF2S2364842; rs24136831	4	yes; intron	ERGIC1	no	Molecular Function Molecular Function	protein binding ER-Golgi intermediate compartment membrane; endoplasmic reticulum membrane; ER to Golgi vesicle-mediated transport
BICF2P176847	7	yes, exon 9	DTNA	no	Cellular Component Biological Processes  Cellular Component	<b>neuromuscular synaptic transmission;</b> calcium ion binding; zinc ion binding; protein binding; striated muscle contraction; signal transduction <b>synapse;</b> cell junction; cytoplasm
BICF2G630460099; rs23187455	34	yes; intron	ATP13A4	no	Biological Processes  Cellular Component	nucleotide binding; ATP binding; hydrolase activity; cation transport; ATPase activity coupled to transmembrane transport of ions integral to membrane