

Supplementary Table S1. RDDGs reference set used in phylogenetic analysis.

Gene	Organism	Taxonomic group	Protein/nucleotide accession number	Chromosome (location)
PEG10	<i>Ailuropoda melanoleuca</i>	Boreoeutheria	ACTA01043706.1	
	<i>Bos taurus</i>	Boreoeutheria	NP_001165989.1	
	<i>Callithrix jacchus</i>	Boreoeutheria	ACFV01062247.1	
	<i>Canis lupus familiaris</i>	Boreoeutheria	NP_001166014	
	<i>Cavia porcellus</i>	Boreoeutheria	AAKN02016859.1	
	<i>Choloepus hoffmanni</i>	Xenarthra	ABVD01060229	
	<i>Dasybus novemcinctus</i>	Xenarthra	AAGV03171820.1	
	<i>Dipodomys ordii</i>	Boreoeutheria	ABRO01072656.1	
	<i>Echinops telfairi</i>	Afrotheria	AAIY01557043	
	<i>Equus caballus</i>	Boreoeutheria	NP_001166029	
	<i>Felis catus</i>	Boreoeutheria	AANG02100824.1	
	<i>Gorilla gorilla</i>	Boreoeutheria	CABD02345544.1	
	<i>Heterocephalus glaber</i>	Boreoeutheria	AFSB01016640.1	
	<i>Homo sapiens</i>	Boreoeutheria	NP_055883	7 (7q21)
	<i>Ictidomys tridecemlineatus</i>	Boreoeutheria	AGTP01068175.1	
	<i>Loxodonta africana</i>	Afrotheria	AAGU03015863.1	
	<i>Macaca mulatta</i>	Boreoeutheria	NP_001165893.1	
	<i>Macropus eugenii</i>	Marsupialia	ABQO020785483.1	
	<i>Microcebus murinus</i>	Boreoeutheria	ABDC01270285.1	
	<i>Mus musculus</i>	Boreoeutheria	NP_570947	
	<i>Mustela putorius furo</i>	Boreoeutheria	AEYP01068702.1	
	<i>Myotis lucifugus</i>	Boreoeutheria	AAPE02008825.1	
	<i>Nomascus leucogenys</i>	Boreoeutheria	ADFV01000933.1	
	<i>Oryctolagus cuniculus</i>	Boreoeutheria	AAGW02035426.1	
	<i>Otolemur garnettii</i>	Boreoeutheria	AAQR03012733.1	
	<i>Pan troglodytes</i>	Boreoeutheria	AACZ03052811.1	
	<i>Pongo abelii</i>	Boreoeutheria	ABGA01007342.1	
	<i>Procavia capensis</i>	Afrotheria	ABRQ01517954.1	
	<i>Pteropus vampyrus</i>	Boreoeutheria	ABRP01146153.1	
	<i>Sarcophilus harrisii</i>	Marsupialia	AFEY01088593.1	
	<i>Sorex araneus</i>	Boreoeutheria	AALT01650199.1	
	<i>Sus scrofa</i>	Boreoeutheria	NP_001120696	
	<i>Trichechus manatus latirostris</i>	Afrotheria	AHIN01116204.1	
	<i>Tursiops truncatus</i>	Boreoeutheria	ABRN02490409.1	
	RGAG4	<i>Bos taurus</i>	Boreoeutheria	AAFC03124894
<i>Callithrix jacchus</i>		Boreoeutheria	ACFV01168828.1	
<i>Canis lupus familiaris</i>		Boreoeutheria	AAEX03026494	
<i>Cavia porcellus</i>		Boreoeutheria	AAKN02029999	
<i>Dasybus novemcinctus</i>		Xenarthra	AAGV03221368.1	
<i>Dipodomys ordii</i>		Boreoeutheria	ABRO01238289.1	
<i>Equus caballus</i>		Boreoeutheria	AAWR02039660.1	
<i>Felis catus</i>		Boreoeutheria	ACBE01497584.1	
<i>Gorilla gorilla</i>		Boreoeutheria	CABD02400541.1	
<i>Heterocephalus glaber</i>		Boreoeutheria	AFSB01128218.1	
<i>Homo sapiens</i>		Boreoeutheria	NP_001019626.1	X (Xq13.1)
<i>Loxodonta africana</i>		Afrotheria	AAGU03048013	
<i>Macaca mulatta</i>		Boreoeutheria	EHH30837	
<i>Microcebus murinus</i>		Boreoeutheria	ABDC01193954.1	
<i>Mus musculus</i>		Boreoeutheria	NP_899141	
<i>Mustela putorius furo</i>		Boreoeutheria	AES05561.1	
<i>Myotis lucifugus</i>		Boreoeutheria	AAPE02004103	

	<i>Nomascus leucogenys</i>	Boreoeutheria	ADSV01127123.1	
	<i>Ochotona princeps</i>	Boreoeutheria	AAVZ01235013.1	
	<i>Oryctolagus cuniculus</i>	Boreoeutheria	AAGW02057529	
	<i>Oryctolagus cuniculus</i>	Boreoeutheria	AAGW02057529.1	
	<i>Otolemur garnettii</i>	Boreoeutheria	AAQR03185996	
	<i>Pan troglodytes</i>	Boreoeutheria	AACZ03139484.1	
	<i>Pongo abelii</i>	Boreoeutheria	ABGA01327151.1	
	<i>Procavia capensis</i>	Afrotheria	ABRQ01198437.1	
	<i>Rattus norvegicus</i>	Boreoeutheria	AABR05180029.1	
	<i>Sorex araneus</i>	Boreoeutheria	AALT01549896.1	
	<i>Trichechus manatus latirostris</i>	Afrotheria	AHIN01073765.1	
	<i>Tupaia belangeri</i>	Boreoeutheria	AAPY01750682.1	
	<i>Tursiops truncatus</i>	Boreoeutheria	ABRN02257176.1	
RGAG1	<i>Bos taurus</i>	Boreoeutheria	XP_001788607	
	<i>Canis lupus familiaris</i>	Boreoeutheria	AAEX03026772.1	
	<i>Cavia porcellus</i>	Boreoeutheria	AAKN02039973.1	
	<i>Dasybus novemcinctus</i>	Xenarthra	AAGV03179636.1	
	<i>Equus caballus</i>	Boreoeutheria	AAWR02039240.1	
	<i>Felis catus</i>	Boreoeutheria	ACBE01502664.1	
	<i>Gorilla gorilla</i>	Boreoeutheria	CABD02405307.1	
	<i>Heterocephalus glaber</i>	Boreoeutheria	AHKG01071915.1	
	<i>Homo sapiens</i>	Boreoeutheria	NP_065820.1	X (Xq23)
	<i>Ictidomys tridecemlineatus</i>	Boreoeutheria	AGTP01029649.1	
	<i>Loxodonta africana</i>	Afrotheria	AAGU03056054.1	
	<i>Macaca mulatta</i>	Boreoeutheria	NP_001177804.1	
	<i>Mus musculus</i>	Boreoeutheria	NP_001035524.1	
	<i>Mustela putorius furo</i>	Boreoeutheria	AGTQ01035711.1	
	<i>Myotis lucifugus</i>	Boreoeutheria	AAPE02002754.1	
	<i>Nomascus leucogenys</i>	Boreoeutheria	ADSV01008253.1	
	<i>Ochotona princeps</i>	Boreoeutheria	AAVZ01396442.1	
	<i>Oryctolagus cuniculus</i>	Boreoeutheria	AAGW02041334.1	
	<i>Otolemur garnettii</i>	Boreoeutheria	AAQR03155329.1	
	<i>Pan troglodytes</i>	Boreoeutheria	AACZ03136290.1	
	<i>Pongo abelii</i>	Boreoeutheria	ABGA01005524.1	
	<i>Pteropus vampyrus</i>	Boreoeutheria	ABRP01260471.1	
	<i>Rattus norvegicus</i>	Boreoeutheria	AAHX01113452.1	
	<i>Tarsius syrichta</i>	Boreoeutheria	ABRT010081689.1	
	<i>Trichechus manatus latirostris</i>	Afrotheria	AHIN01071955.1	
	<i>Tupaia belangeri</i>	Boreoeutheria	AAPY01382729.1	
RTL1	<i>Bos taurus</i>	Boreoeutheria	NP_001181949	
	<i>Callithrix jacchus</i>	Boreoeutheria	ACFV01132248.1	
	<i>Canis lupus familiaris</i>	Boreoeutheria	AAEX03006004	
	<i>Cavia porcellus</i>	Boreoeutheria	AAKN02051948.1	
	<i>Choloepus hoffmanni</i>	Xenarthra	ABVD01521323.1	
	<i>Dasybus novemcinctus</i>	Xenarthra	AAGV03256735.1	
	<i>Daubentonia madagascariensis</i>	Boreoeutheria	AGTM011756538.1	
	<i>Dipodomys ordii</i>	Boreoeutheria	ABRO01195543.1	
	<i>Equus caballus</i>	Boreoeutheria	AAWR02020062.1	
	<i>Felis catus</i>	Boreoeutheria	AANG02058241.1	
	<i>Gorilla gorilla</i>	Boreoeutheria	CABD02116350.1	
	<i>Heterocephalus glaber</i>	Boreoeutheria	EHB11169.1	
	<i>Homo sapiens</i>	Boreoeutheria	AAI50618	14 (14q32.2)
	<i>Ictidomys tridecemlineatus</i>	Boreoeutheria	AGTP01074072.1	
	<i>Loxodonta africana</i>	Afrotheria	AAGU03025978	
	<i>Macaca mulatta</i>	Boreoeutheria	XP_001110319	
	<i>Microcebus murinus</i>	Boreoeutheria	ABDC01565557.1	
	<i>Mus musculus</i>	Boreoeutheria	NP_908998	
	<i>Mustela putorius furo</i>	Boreoeutheria	AEYP01037657.1	
	<i>Myotis lucifugus</i>	Boreoeutheria	AAPE02047295.1	
	<i>Nomascus leucogenys</i>	Boreoeutheria	ADSV01092893.1	

	<i>Ochotona princeps</i>	Boreoeutheria	AAYZ01391477	
	<i>Oryctolagus cuniculus</i>	Boreoeutheria	AAGW02077263.1	
	<i>Otolemur garnettii</i>	Boreoeutheria	AAQR03046506.1	
	<i>Pan troglodytes</i>	Boreoeutheria	AADA01312366.1	
	<i>Pongo abelii</i>	Boreoeutheria	ABGA01039457.1	
	<i>Procapra capensis</i>	Afrotheria	ABRQ01643018	
	<i>Pteropus vampyrus</i>	Boreoeutheria	ABRP01223356.1	
	<i>Trichechus manatus latirostris</i>	Afrotheria	AHIN01054610.1	
	<i>Tursiops truncatus</i>	Boreoeutheria	ABRN02353414.1	
ZCCHC16	<i>Callithrix jacchus</i>	Boreoeutheria	ACFV01055746.1	
	<i>Canis lupus familiaris</i>	Boreoeutheria	XP_549194	
	<i>Choloepus hoffmanni</i>	Xenarthra	ABVD01449713.1 *	
	<i>Daubentonia madagascariensis</i>	Boreoeutheria	AGTM011637388.1	
	<i>Echinops telfairi</i>	Afrotheria	AAIY01429107.1	
	<i>Equus caballus</i>	Boreoeutheria	XP_001488764	
	<i>Felis catus</i>	Boreoeutheria	AANG02074530.1	
	<i>Gorilla gorilla</i>	Boreoeutheria	CABD02405487.1	
	<i>Homo sapiens</i>	Boreoeutheria	NP_001004308	X (Xq23)
	<i>Ictidomys tridecemlineatus</i>	Boreoeutheria	AAQQ01371003.1	
	<i>Loxodonta africana</i>	Afrotheria	AAGU03055959.1	
	<i>Macaca mulatta</i>	Boreoeutheria	NP_001181102	
	<i>Mus musculus</i>	Boreoeutheria	NP_001028967	
	<i>Mustela putorius furo</i>	Boreoeutheria	AEYP01071779.1	
	<i>Myotis lucifugus</i>	Boreoeutheria	AAPE02002693	
	<i>Nomascus leucogenys</i>	Boreoeutheria	ADFV01008333.1	
	<i>Oryctolagus cuniculus</i>	Boreoeutheria	XP_002720260	
	<i>Otolemur garnettii</i>	Boreoeutheria	AAQR03170339.1	
	<i>Pan troglodytes</i>	Boreoeutheria	AADA01038094.1	
	<i>Procapra capensis</i>	Afrotheria	ABRQ01131885.1	
	<i>Trichechus manatus latirostris</i>	Afrotheria	AHIN01072081.1	
ZCCHC5	<i>Equus caballus</i>	Boreoeutheria	XP_003365869.1	
	<i>Gorilla gorilla</i>	Boreoeutheria	CABD02401497.1	
	<i>Homo sapiens</i>	Boreoeutheria	AAI36549	X (Xq21.1)
	<i>Ictidomys tridecemlineatus</i>	Boreoeutheria	AGTP01054468.1	
	<i>Macaca mulatta</i>	Boreoeutheria	AANU01174818.1	
	<i>Mus musculus</i>	Boreoeutheria	NP_955762	
	<i>Myotis lucifugus</i>	Boreoeutheria	AAPE02003884.1	
	<i>Nomascus leucogenys</i>	Boreoeutheria	ADFV01047424.1	
	<i>Oryctolagus cuniculus</i>	Boreoeutheria	AAGW02041680.1	
	<i>Pan troglodytes</i>	Boreoeutheria	AADA01082408.1	
	<i>Pongo abelii</i>	Boreoeutheria	ABGA01280131.1	
	<i>Pteropus vampyrus</i>	Boreoeutheria	ENSPVAP00000003872	
	<i>Pteropus vampyrus</i>	Boreoeutheria	ABRP01216211.1	
	<i>Trichechus manatus latirostris</i>	Afrotheria	AHIN01066567.1 *	
	<i>Tupaia belangeri</i>	Boreoeutheria	AAPY01750949	
	<i>Tursiops truncatus</i>	Boreoeutheria	ABRN02156766.1	
LDOC1	<i>Bos taurus</i>	Boreoeutheria	NP_001075013.1	
	<i>Callithrix jacchus</i>	Boreoeutheria	ACFV01165274.1	
	<i>Canis lupus familiaris</i>	Boreoeutheria	AAEX03026983.1	
	<i>Cavia porcellus</i>	Boreoeutheria	XP_003464753.1	
	<i>Dasyurus novemcinctus</i>	Xenarthra	AAGV03124563.1	
	<i>Dipodomys ordii</i>	Boreoeutheria	ABRO01183309.1	
	<i>Echinops telfairi</i>	Afrotheria	AAIY01054437	
	<i>Equus caballus</i>	Boreoeutheria	AAWR02041332.1	
	<i>Erinaceus europaeus</i>	Boreoeutheria	AANN01096519.1	
	<i>Felis catus</i>	Boreoeutheria	AANG02125169.1	
	<i>Gorilla gorilla</i>	Boreoeutheria	CABD02409225.1	
	<i>Heterocephalus glaber</i>	Boreoeutheria	AHKG01074095.1	
	<i>Homo sapiens</i>	Boreoeutheria	NP_036449.1	X (Xq27)

	<i>Ictidomys tridecemlineatus</i>	Boreoeutheria	AGTP01037783.1	
	<i>Macaca mulatta</i>	Boreoeutheria	XP_001085397.1	
	<i>Mus musculus</i>	Boreoeutheria	NP_001018097.1	
	<i>Mustela putorius furo</i>	Boreoeutheria	AEYP01102792.1	
	<i>Myotis lucifugus</i>	Boreoeutheria	AAPE02042786.1	
	<i>Nomascus leucogenys</i>	Boreoeutheria	ADVF01118802.1	
	<i>Ochotona princeps</i>	Boreoeutheria	AAYZ01654760.1	
	<i>Oryctolagus cuniculus</i>	Boreoeutheria	AAGW02055714.1	
	<i>Otolemur garnettii</i>	Boreoeutheria	AAQR03136356.1	
	<i>Pan troglodytes</i>	Boreoeutheria	AACZ03140206.1	
	<i>Pteropus vampyrus</i>	Boreoeutheria	ABRP01249445	
	<i>Trichechus manatus latirostris</i>	Afrotheria	AHIN01080024.1	
	<i>Tupaia belangeri</i>	Boreoeutheria	AAPY01387257.1	
	<i>Tursiops truncatus</i>	Boreoeutheria	ABRN02225857.1	
LDOC1L				
	<i>Bos taurus</i>	Boreoeutheria	XP_001253890.1	
	<i>Callithrix jacchus</i>	Boreoeutheria	ACFV01163893.1	
	<i>Canis lupus familiaris</i>	Boreoeutheria	XP_538334.1	
	<i>Cavia porcellus</i>	Boreoeutheria	AAKN02056344	
	<i>Dasypus novemcinctus</i>	Xenarthra	AAGV03215739.1	
	<i>Equus caballus</i>	Boreoeutheria	AAWR02040740.1	
	<i>Felis catus</i>	Boreoeutheria	AANG02167187.1	
	<i>Heterocephalus glaber</i>	Boreoeutheria	AHKG01032576.1	
	<i>Homo sapiens</i>	Boreoeutheria	NP_115663.2	22 (22q13.31)
	<i>Ictidomys tridecemlineatus</i>	Boreoeutheria	AGTP01098895.1	
	<i>Loxodonta africana</i>	Afrotheria	AAGU03077096.1	
	<i>Macaca mulatta</i>	Boreoeutheria	NP_001181372.1	
	<i>Mus musculus</i>	Boreoeutheria	NP_808298.2	
	<i>Mustela putorius furo</i>	Boreoeutheria	AGTQ01046253.1	
	<i>Myotis lucifugus</i>	Boreoeutheria	AAPE02062099	
	<i>Myotis lucifugus</i>	Boreoeutheria	AAPE02062099.1	
	<i>Nomascus leucogenys</i>	Boreoeutheria	ADVF01132078.1	
	<i>Otolemur garnettii</i>	Boreoeutheria	AAQR03015785.1	
	<i>Ovis aries</i>	Boreoeutheria	ACIV010481667.1	
	<i>Pan troglodytes</i>	Boreoeutheria	AADA01102719.1	
	<i>Pongo abelii</i>	Boreoeutheria	ABGA01382764.1	
	<i>Procavia capensis</i>	Afrotheria	ABRQ01229456.1	
	<i>Pteropus vampyrus</i>	Boreoeutheria	ABRP01299088.1	
	<i>Rattus norvegicus</i>	Boreoeutheria	AAHX01051963.1	
	<i>Tarsius syrichta</i>	Boreoeutheria	ABRT010780528.1	
	<i>Trichechus manatus latirostris</i>	Afrotheria	AHIN01072820.1	
	<i>Tupaia belangeri</i>	Boreoeutheria	AAPY01023583.1	
	<i>Tursiops truncatus</i>	Boreoeutheria	ABRN02316718.1	
FAM127				
	<i>Bos taurus</i>	Boreoeutheria	NP_001068990	
	<i>Callithrix jacchus</i>	Boreoeutheria	ACFV01112550.1	
	<i>Canis lupus familiaris</i>	Boreoeutheria	XP_003435578	
	<i>Dasypus novemcinctus</i>	Xenarthra	AAGV03237809.1	
	<i>Dipodomys ordii</i>	Boreoeutheria	ABRO01163821.1	
	<i>Echinops telfairi</i>	Afrotheria	AAIY01063307.1	
	<i>Equus caballus</i>	Boreoeutheria	AAWR02034063.1	
	<i>Erinaceus europaeus</i>	Boreoeutheria	AANN01497583.1	
	<i>Gorilla gorilla</i>	Boreoeutheria	CABD02408507.1	
	<i>Heterocephalus glaber</i>	Boreoeutheria	AFSB01136187.1	
	<i>Homo sapiens</i>	Boreoeutheria	NP_001071639.1	X (Xq26)
	<i>Ictidomys tridecemlineatus</i>	Boreoeutheria	AGTP01094767.1	
	<i>Loxodonta africana</i>	Afrotheria	AAGU03084152.1	
	<i>Macaca mulatta</i>	Boreoeutheria	NP_001181065	
	<i>Microcebus murinus</i>	Boreoeutheria	ABDC01334399.1	
	<i>Mus musculus</i>	Boreoeutheria	AAHY01743160.1	
	<i>Mustela putorius furo</i>	Boreoeutheria	AGTQ01047722.1	
	<i>Myotis lucifugus</i>	Boreoeutheria	AAPE02002176.1	

	<i>Nomascus leucogenys</i>	Boreoeutheria	ADVV01072099.1	
	<i>Ochotona princeps</i>	Boreoeutheria	AAVZ01491877	
	<i>Oryctolagus cuniculus</i>	Boreoeutheria	AAGW02046818.1	
	<i>Otolemur garnettii</i>	Boreoeutheria	AAQR03189099	
	<i>Otolemur garnettii</i>	Boreoeutheria	AAQR03189099.1	
	<i>Pan troglodytes</i>	Boreoeutheria	AADA01342505.1	
	<i>Pongo abelii</i>	Boreoeutheria	ABGA01295535.1	
	<i>Procavia capensis</i>	Afrotheria	ABRQ01574575.1	
	<i>Pteropus vampyrus</i>	Boreoeutheria	ABRP01194706.1	
	<i>Tarsius syrichta</i>	Boreoeutheria	ABRT011084406.1	
	<i>Tursiops truncatus</i>	Boreoeutheria	ABRN02215744.1	
	<i>Vicugna pacos</i>	Boreoeutheria	ABRR01323960.1	
SIRH12				
	<i>Macropus eugenii</i>	Marsupialia	ABQO020446584.1	
C22orf29				
	<i>Callithrix jacchus</i>	Boreoeutheria	XP_002743589.1	
	<i>Dipodomys ordii</i>	Boreoeutheria	ABRO01388190.1	
	<i>Echinops telfairi</i>	Afrotheria	ENSETET00000016288 *	
	<i>Homo sapiens</i>	Boreoeutheria	NP_078903.3	22 (22q11.21)
	<i>Ictidomys tridecemlineatus</i>	Boreoeutheria	AGTP01078122.1	
	<i>Loxodonta africana</i>	Afrotheria	AAGU03075386.1 *	
	<i>Macaca mulatta</i>	Boreoeutheria	AFE75991.1	
	<i>Nomascus leucogenys</i>	Boreoeutheria	XP_003280408.1	
	<i>Oryctolagus cuniculus</i>	Boreoeutheria	AAGW02072302.1	
	<i>Pan troglodytes</i>	Boreoeutheria	NP_001230896.1	
	<i>Pongo abelii</i>	Boreoeutheria	XP_002830899.1	
	<i>Trichechus manatus latirostris</i>	Afrotheria	AHIN01144892.1 *	

Gene	Organism	Taxonomic group	Protein/nucleotide accession number	Chromosome (location)
PNMA1	<i>Ailuropoda melanoleuca</i>	Boreoeutheria	XP_002914729	
	<i>Bos taurus</i>	Boreoeutheria	NP_001098461	
	<i>Callithrix jacchus</i>	Boreoeutheria	XP_002754140	
	<i>Canis lupus familiaris</i>	Boreoeutheria	XP_547896	
	<i>Cavia porcellus</i>	Boreoeutheria	XP_003472455.1	
	<i>Choloepus hoffmanni</i>	Xenarthra	ABVD01858941	
	<i>Cricetulus griseus</i>	Boreoeutheria	XP_003505180.1	
	<i>Dasyopus novemcinctus</i>	Xenarthra	AAGV03070378.1	
	<i>Echinops telfairi</i>	Afrotheria	AAIY01462143.1	
	<i>Equus caballus</i>	Boreoeutheria	XP_001490004	
	<i>Felis catus</i>	Boreoeutheria	ACBE01211376	
	<i>Gorilla gorilla</i>	Boreoeutheria	CABD02112671	
	<i>Heterocephalus glaber</i>	Boreoeutheria	AFSB01202249.1	
	<i>Homo sapiens</i>	Boreoeutheria	NP_006020	14 (14q24.3)
	<i>Ictidomys tridecemlineatus</i>	Boreoeutheria	AGTP01020471.1	
	<i>Loxodonta africana</i>	Afrotheria	XP_003408802.1	
	<i>Macaca mulatta</i>	Boreoeutheria	XP_001091302	
	<i>Mus musculus</i>	Boreoeutheria	NP_081714	
	<i>Mustela putorius furo</i>	Boreoeutheria	AGTQ01032725	
	<i>Myotis lucifugus</i>	Boreoeutheria	AAPE02034650	
	<i>Nomascus leucogenys</i>	Boreoeutheria	XR_121367.1	
	<i>Oryctolagus cuniculus</i>	Boreoeutheria	XP_002719706.1	
	<i>Otolemur garnettii</i>	Boreoeutheria	AAQR03045035	
	<i>Pan troglodytes</i>	Boreoeutheria	XP_001141691	
	<i>Pongo abelii</i>	Boreoeutheria	XP_002824970	
	<i>Pteropus vampyrus</i>	Boreoeutheria	ABRP01196995	
	<i>Rattus norvegicus</i>	Boreoeutheria	NP_570833	
	<i>Sorex araneus</i>	Boreoeutheria	AALT01503131	
	<i>Sus scrofa</i>	Boreoeutheria	XP_001928996	
	<i>Tarsius syrichta</i>	Boreoeutheria	ABRT010588175	
	<i>Trichechus manatus latirostris</i>	Afrotheria	AHIN01016586.1	
	<i>Tupaia belangeri</i>	Boreoeutheria	AAPY01355955	
	<i>Tursiops truncatus</i>	Boreoeutheria	ABRN01411963	
PNMA2	<i>Ailuropoda melanoleuca</i>	Boreoeutheria	ACTA01184811.1	
	<i>Bos taurus</i>	Boreoeutheria	NP_001039938	
	<i>Callithrix jacchus</i>	Boreoeutheria	XP_002756910.1	
	<i>Canis lupus familiaris</i>	Boreoeutheria	XP_543234	
	<i>Choloepus hoffmanni</i>	Xenarthra	ABVD01322223.1 *	
	<i>Cricetulus griseus</i>	Boreoeutheria	XP_003505211.1	
	<i>Dasyopus novemcinctus</i>	Xenarthra	AAGV03058646.1	
	<i>Daubentonia madagascariensis</i>	Boreoeutheria	AGTM010363728.1	
	<i>Echinops telfairi</i>	Afrotheria	AAIY01539302	
	<i>Equus caballus</i>	Boreoeutheria	XP_001494457.1	
	<i>Felis catus</i>	Boreoeutheria	ACBE01547290.1	
	<i>Gorilla gorilla</i>	Boreoeutheria	CABD02358444.1	
	<i>Heterocephalus glaber</i>	Boreoeutheria	AFSB01189534	
	<i>Homo sapiens</i>	Boreoeutheria	NP_009188	8 (8p21.2)
	<i>Ictidomys tridecemlineatus</i>	Boreoeutheria	AGTP01103703.1	
	<i>Loxodonta africana</i>	Afrotheria	AAGU03044807	
	<i>Macaca mulatta</i>	Boreoeutheria	XP_001108453.1	
	<i>Microcebus murinus</i>	Boreoeutheria	ABDC01025881	
	<i>Mus musculus</i>	Boreoeutheria	NP_780707	
	<i>Mustela putorius furo</i>	Boreoeutheria	AEYP01085655	
	<i>Myotis lucifugus</i>	Boreoeutheria	AAPE02029833.1	

	<i>Nomascus leucogenys</i>	Boreoeutheria	XP_003272943.1	
	<i>Oryctolagus cuniculus</i>	Boreoeutheria	XP_002709354.1	
	<i>Otolemur garnettii</i>	Boreoeutheria	AAQR03106253.1	
	<i>Pan troglodytes</i>	Boreoeutheria	XP_528094	
	<i>Pongo abelii</i>	Boreoeutheria	NP_001127009	
	<i>Procapra capensis</i>	Afrotheria	ABRQ01301107.1	
	<i>Rattus norvegicus</i>	Boreoeutheria	NP_001100742	
	<i>Sorex araneus</i>	Boreoeutheria	AALT01151904	
	<i>Sus scrofa</i>	Boreoeutheria	XP_001925541.2	
	<i>Tarsius syrichta</i>	Boreoeutheria	ABRT010502723.1	
	<i>Trichechus manatus latirostris</i>	Afrotheria	AHIN01086405	
	<i>Tupaia belangeri</i>	Boreoeutheria	AAPY01194613.1	
	<i>Tursiops truncatus</i>	Boreoeutheria	ABRN02419377.1	
MOAPI				
	<i>Callithrix jacchus</i>	Boreoeutheria	XP_002754262.1	
	<i>Cricetulus griseus</i>	Boreoeutheria	XP_003506983.1	
	<i>Dasyurus novemcinctus</i>	Xenarthra	AAGV03218223.1 *	
	<i>Daubentonina madagascariensis</i>	Boreoeutheria	AGTM011692791.1	
	<i>Felis catus</i>	Boreoeutheria	ACBE01574473	
	<i>Gorilla gorilla</i>	Boreoeutheria	CABD02115479.1	
	<i>Homo sapiens</i>	Boreoeutheria	NP_071434	14 (14q32)
	<i>Ictidomys tridecemlineatus</i>	Boreoeutheria	AAQQ01349199.1	
	<i>Loxodonta africana</i>	Afrotheria	XP_003408887.1	
	<i>Macaca mulatta</i>	Boreoeutheria	XP_001089203	
	<i>Mus musculus</i>	Boreoeutheria	NP_001136409	
	<i>Mustela putorius furo</i>	Boreoeutheria	AEYP01037879.1	
	<i>Nomascus leucogenys</i>	Boreoeutheria	XP_003260955.1	
	<i>Otolemur garnettii</i>	Boreoeutheria	AAQR03046215	
	<i>Pan troglodytes</i>	Boreoeutheria	XP_510137	
	<i>Pongo abelii</i>	Boreoeutheria	XP_002825093.1	
	<i>Procapra capensis</i>	Afrotheria	ABRQ01189423.1	
	<i>Rattus norvegicus</i>	Boreoeutheria	NP_001013119	
	<i>Spermophilus tridecemlineatus</i>	Boreoeutheria	AAQQ01349199	
	<i>Trichechus manatus latirostris</i>	Afrotheria	AHIN01054316.1	
PNMA3				
	<i>Callithrix jacchus</i>	Boreoeutheria	XP_002763430.1	
	<i>Dasyurus novemcinctus</i>	Xenarthra	AAGV03164000.1	
	<i>Equus caballus</i>	Boreoeutheria	XP_001496576.1	
	<i>Felis catus</i>	Boreoeutheria	AANG01462554	
	<i>Homo sapiens</i>	Boreoeutheria	NP_037496	X (Xq28)
	<i>Ictidomys tridecemlineatus</i>	Boreoeutheria	AGTP01098202.1	
	<i>Loxodonta africana</i>	Afrotheria	AAGU03085805.1	
	<i>Macaca mulatta</i>	Boreoeutheria	XP_001083094	
	<i>Mus musculus</i>	Boreoeutheria	NP_694809	
	<i>Mustela putorius furo</i>	Boreoeutheria	AGTQ01072216.1	
	<i>Myotis lucifugus</i>	Boreoeutheria	AAPE02015504	
	<i>Nomascus leucogenys</i>	Boreoeutheria	XP_003271923.1	
	<i>Pan troglodytes</i>	Boreoeutheria	XP_001145572.1	
	<i>Pongo abelii</i>	Boreoeutheria	XP_002832318.1	
	<i>Pteropus vampyrus</i>	Boreoeutheria	ABRP01300743.1	
	<i>Rattus norvegicus</i>	Boreoeutheria	NP_001099812	
PNMA5				
	<i>Callithrix jacchus</i>	Boreoeutheria	XP_002763433.1	
	<i>Cavia porcellus</i>	Boreoeutheria	AAKN02056074	
	<i>Dasyurus novemcinctus</i>	Xenarthra	AAGV03164006.1	
	<i>Dipodomys ordii</i>	Boreoeutheria	ABRO01400221.1	
	<i>Equus caballus</i>	Boreoeutheria	XP_003365951.1	
	<i>Gorilla gorilla</i>	Boreoeutheria	CABD02410430.1	
	<i>Homo sapiens</i>	Boreoeutheria	NP_001096620	X (Xq28)
	<i>Ictidomys tridecemlineatus</i>	Boreoeutheria	AGTP01098209.1	

	<i>Loxodonta africana</i>	Afrotheria	XP_003421289.1	
	<i>Macaca mulatta</i>	Boreoeutheria	XP_001082427.1	
	<i>Microcebus murinus</i>	Boreoeutheria	ABDC01277479	
	<i>Mus musculus</i>	Boreoeutheria	NP_001093931	
	<i>Myotis lucifugus</i>	Boreoeutheria	AAPE02015506.1	
	<i>Nomascus leucogenys</i>	Boreoeutheria	XP_003271921.1	
	<i>Otolemur garnettii</i>	Boreoeutheria	AAQR03167750	
	<i>Pteropus vampyrus</i>	Boreoeutheria	ABRP01159492	
	<i>Rattus norvegicus</i>	Boreoeutheria	NP_001101049	
	<i>Trichechus manatus latirostris</i>	Afrotheria	AHIN01144502.1	
	<i>Tupaia belangeri</i>	Boreoeutheria	AAPY01451866.1	
	<i>Tursiops truncatus</i>	Boreoeutheria	ABRN02551903.1	
	<i>Vicugna pacos</i>	Boreoeutheria	ABRR01273839.1	
PNMA6				
	<i>Ailuropoda melanoleuca</i>	Boreoeutheria	XP_002930132.1	
	<i>Canis lupus familiaris</i>	Boreoeutheria	XP_549350	
	<i>Canis lupus familiaris</i>	Boreoeutheria	AAEX03027066.1	
	<i>Dasybus novemcinctus</i>	Xenarthra	AAGV03164002.1	
	<i>Dipodomys ordii</i>	Boreoeutheria	ABRO01263040	
	<i>Dipodomys ordii</i>	Boreoeutheria	ABRO01263040.1	
	<i>Echinops telfairi</i>	Afrotheria	AAIY01541208.1	
	<i>Equus caballus</i>	Boreoeutheria	ENSECAT00000014076	
	<i>Felis catus</i>	Boreoeutheria	ACBE01511238	
	<i>Homo sapiens</i>	Boreoeutheria	NP_116271	X (Xq28)
	<i>Ictidomys tridecemlineatus</i>	Boreoeutheria	AGTP01098201.1	
	<i>Mustela putorius furo</i>	Boreoeutheria	AEYP01114530.1	
	<i>Myotis lucifugus</i>	Boreoeutheria	AAPE02015504.1	
	<i>Otolemur garnettii</i>	Boreoeutheria	AAQR03194462.1	
	<i>Pongo abelii</i>	Boreoeutheria	ABGA01401781.1	
	<i>Pteropus vampyrus</i>	Boreoeutheria	ABRP01291682	
	<i>Trichechus manatus latirostris</i>	Afrotheria	AHIN01144511.1	
	<i>Tursiops truncatus</i>	Boreoeutheria	ENSTTRP00000001277	
ZCCHC12				
	<i>Ailuropoda melanoleuca</i>	Boreoeutheria	XP_002916128.1	
	<i>Bos taurus</i>	Boreoeutheria	NP_001069665	
	<i>Canis lupus familiaris</i>	Boreoeutheria	XP_549212	
	<i>Cavia porcellus</i>	Boreoeutheria	XP_003467642.1	
	<i>Cricetulus griseus</i>	Boreoeutheria	AFTD01039914.1	
	<i>Dasybus novemcinctus</i>	Xenarthra	AAGV03098506.1	
	<i>Dipodomys ordii</i>	Boreoeutheria	ABRO01263293.1	
	<i>Equus caballus</i>	Boreoeutheria	XP_001487947	
	<i>Erinaceus europaeus</i>	Boreoeutheria	AANN01151507	
	<i>Felis catus</i>	Boreoeutheria	ACBE01504543.1	
	<i>Gorilla gorilla</i>	Boreoeutheria	CABD02404599.1	
	<i>Homo sapiens</i>	Boreoeutheria	NP_776159	X (Xq24)
	<i>Ictidomys tridecemlineatus</i>	Boreoeutheria	AAQQ01371946.1	
	<i>Macaca mulatta</i>	Boreoeutheria	XP_001099794	
	<i>Microcebus murinus</i>	Boreoeutheria	ABDC01181532	
	<i>Mus musculus</i>	Boreoeutheria	NP_082601	
	<i>Mustela putorius furo</i>	Boreoeutheria	AGTQ01053520.1	
	<i>Nomascus leucogenys</i>	Boreoeutheria	XP_003262290.1	
	<i>Oryctolagus cuniculus</i>	Boreoeutheria	XP_002720256.1	
	<i>Ovis aries</i>	Boreoeutheria	ACIV012295118.1	
	<i>Pan troglodytes</i>	Boreoeutheria	XP_529128.3	
	<i>Pongo abelii</i>	Boreoeutheria	XP_002832079	
	<i>Pongo abelii</i>	Boreoeutheria	XP_002831991.1	
	<i>Procavia capensis</i>	Afrotheria	ABRQ01217588	
	<i>Pteropus vampyrus</i>	Boreoeutheria	ABRP01045922.1	
	<i>Rattus norvegicus</i>	Boreoeutheria	NP_001014087	
	<i>Spermophilus tridecemlineatus</i>	Boreoeutheria	AAQQ01371946	

	<i>Sus scrofa</i>	Boreoeutheria	XP_003135397.1	
	<i>Trichechus manatus latirostris</i>	Afrotheria	AHIN01072378.1	
	<i>Tursiops truncatus</i>	Boreoeutheria	ABRN02045262.1	
	<i>Vicugna pacos</i>	Boreoeutheria	ABRR01371617.1	
PNMAL1				
	<i>Ailuropoda melanoleuca</i>	Boreoeutheria	ACTA01042111.1	
	<i>Bos taurus</i>	Boreoeutheria	NP_001095982	
	<i>Callithrix jacchus</i>	Boreoeutheria	ACFV01175909.1	
	<i>Canis lupus familiaris</i>	Boreoeutheria	AAEX03000861.1	
	<i>Cavia porcellus</i>	Boreoeutheria	XP_003464736.1	
	<i>Dasybus novemcinctus</i>	Xenarthra	AAGV03076085.1	
	<i>Dipodomys ordii</i>	Boreoeutheria	ABRO01140072.1	
	<i>Equus caballus</i>	Boreoeutheria	AAWR02030549.1	
	<i>Gorilla gorilla</i>	Boreoeutheria	CABD02181514.1	
	<i>Heterocephalus glaber</i>	Boreoeutheria	AFSB01041974.1	
	<i>Homo sapiens</i>	Boreoeutheria	NP_060685	19 (19q13.32)
	<i>Ictidomys tridecemlineatus</i>	Boreoeutheria	AGTP01089491.1	
	<i>Loxodonta africana</i>	Afrotheria	AAGU03011748.1	
	<i>Macaca mulatt</i>	Boreoeutheria	AEHK01141396.1	
	<i>Microcebus murinus</i>	Boreoeutheria	ABDC01329145	
	<i>Mus musculus</i>	Boreoeutheria	NP_001007570	
	<i>Mustela putorius furo</i>	Boreoeutheria	AEYP01068380.1	
	<i>Myotis lucifugus</i>	Boreoeutheria	AAPE02061731	
	<i>Nomascus leucogenys</i>	Boreoeutheria	ADSV01102146.1	
	<i>Oryctolagus cuniculus</i>	Boreoeutheria	AAGW02072742.1	
	<i>Otolemur garnettii</i>	Boreoeutheria	AAQR03153780.1	
	<i>Pan troglodytes</i>	Boreoeutheria	XP_524313	
	<i>Pongo abelii</i>	Boreoeutheria	NP_001125341	
	<i>Pteropus vampyrus</i>	Boreoeutheria	ABRP01162274.1	
	<i>Rattus norvegicus</i>	Boreoeutheria	NP_001101943	
	<i>Tarsius syrichta</i>	Boreoeutheria	ABRT010554846.1	
	<i>Trichechus manatus latirostris</i>	Afrotheria	AHIN01084034.1	
	<i>Tursiops truncatus</i>	Boreoeutheria	ABRN02000473.1	
PNMAL2				
	<i>Callithrix jacchus</i>	Boreoeutheria	ACFV01108478.1	
	<i>Echinops telfairi</i>	Afrotheria	AAIY01565835.1	
	<i>Homo sapiens</i>	Boreoeutheria	NP_065760	19 (19q13.32)
	<i>Loxodonta africana</i>	Afrotheria	XP_003406745.1	
	<i>Macaca mulatta</i>	Boreoeutheria	AANU01182480.1	
	<i>Mus musculus</i>	Boreoeutheria	NP_001093106	
	<i>Mustela putorius furo</i>	Boreoeutheria	AEYP01068377.1	
	<i>Nomascus leucogenys</i>	Boreoeutheria	ADSV01102148.1	
	<i>Otolemur garnettii</i>	Boreoeutheria	AAQR03153784	
	<i>Pan troglodytes</i>	Boreoeutheria	XP_001167965	
	<i>Pongo abelii</i>	Boreoeutheria	XP_002829490	
	<i>Rattus norvegicus</i>	Boreoeutheria	NP_001100951	
	<i>Trichechus manatus latirostris</i>	Afrotheria	AHIN01084034.1	
ZCCHC18				
	<i>Cricetulus griseus</i>	Boreoeutheria	AFTD01070222.1	
	<i>Homo sapiens</i>	Boreoeutheria	NP_001137450	X (Xq22.2)
	<i>Ictidomys tridecemlineatus</i>	Boreoeutheria	AGTP01013369.1	
	<i>Mus musculus</i>	Boreoeutheria	NP_001030586	
	<i>Nomascus leucogenys</i>	Boreoeutheria	ADSV01007938.1	
	<i>Canis lupus familiaris</i>	Boreoeutheria	XP_549160.3	
	<i>Pan troglodytes</i>	Boreoeutheria	XP_003317651.1	
	<i>Rattus norvegicus</i>	Boreoeutheria	AAHX01113221.1	
	<i>Trichechus manatus latirostris</i>	Afrotheria	AHIN01134087.1	
CCDC8				
	<i>Bos taurus</i>	Boreoeutheria	AAX31380.1	
	<i>Canis lupus familiaris</i>	Boreoeutheria	XP_003432615.1	

	<i>Cavia porcellus</i>	Boreoeutheria	XP_003464735.1	
	<i>Equus caballus</i>	Boreoeutheria	XP_001502968.3	
	<i>Homo sapiens</i>	Boreoeutheria	NP_114429.2	19 (19q13.32)
	<i>Loxodonta africana</i>	Afrotheria	AAGU03011749.1	
	<i>Macaca mulatta</i>	Boreoeutheria	XP_001111790.1	
	<i>Mus musculus</i>	Boreoeutheria	EDL42061.1	
	<i>Pan troglodytes</i>	Boreoeutheria	XP_001167818.1	
	<i>Pongo abelii</i>	Boreoeutheria	XP_002829489.1	
M-PNMA				
	<i>Macropus eugenii</i>	Marsupialia	BAK55632.1	
	<i>Monodelphis domestica</i>	Marsupialia	AAFR03007941	3
	<i>Sarcophilus harrisii</i>	Marsupialia	AFEY01451898	

Gene	Organism	Taxonomic group	Protein/nucleotide accession number	Chromosome (location)
GIN1	<i>Ailuropoda melanoleuca</i>	Boreoeutheria	ACTA01147224.1	
	<i>Anolis carolinensis</i>	Sauropsida	ENSACAP00000006979	
	<i>Bos taurus</i>	Boreoeutheria	DAA22293.1	
	<i>Callithrix jacchus</i>	Boreoeutheria	ACFV01006841.1	
	<i>Canis lupus familiaris</i>	Boreoeutheria	XP_003639006.1	
	<i>Choloepus hoffmanni</i>	Xenarthra	ABVD01699732.1	
	<i>Chrysemys picta bellii</i>	Sauropsida	AHGY01271991.1	
	<i>Dasybus novemcinctus</i>	Xenarthra	ENSDNOP00000015601	
	<i>Daubentonia madagascariensis</i>	Boreoeutheria	AGTM011584885.1	
	<i>Dipodomys ordii</i>	Boreoeutheria	ENSDORP00000010277	
	<i>Echinops telfairi</i>	Afrotheria	AAIY01023878.1	
	<i>Equus caballus</i>	Boreoeutheria	ENSECAT00000022350	
	<i>Felis catus</i>	Boreoeutheria	ACBE01035028.1	
	<i>Gallus gallus</i>	Sauropsida	ENSGALT00000024621	Z
	<i>Gorilla gorilla</i>	Boreoeutheria	CABD02299754.1	
	<i>Heterocephalus glaber</i>	Boreoeutheria	AFSB01096689.1	
	<i>Homo sapiens</i>	Boreoeutheria	NP_060146.2	5 (5q21.1)
	<i>Ictidomys tridecemlineatus</i>	Boreoeutheria	AGTP01043191.1	
	<i>Loxodonta africana</i>	Afrotheria	XP_003405049.1	
	<i>Macaca mulatta</i>	Boreoeutheria	NP_001181013	
	<i>Macropus eugenii</i>	Marsupialia	ABQO020290995.1	
	<i>Meleagris gallopavo</i>	Sauropsida	ADDD01043941.1	
	<i>Melopsittacus undulatus budgerigar</i>	Sauropsida	AGAI01041143.1	
	<i>Microcebus murinus</i>	Boreoeutheria	ABDC01264238.1	
	<i>Monodelphis domestica</i>	Marsupialia	ENSMODT00000024502	
	<i>Mus musculus</i>	Boreoeutheria	NP_080526	
	<i>Mustela putorius furo</i>	Boreoeutheria	AEYP01072838.1	
	<i>Myotis lucifugus</i>	Boreoeutheria	AAPE02000394.1	
	<i>Nomascus leucogenys</i>	Boreoeutheria	ADRV01187285.1	
	<i>Ochotona princeps</i>	Boreoeutheria	ENSOPRP00000013878	
	<i>Ornithorhynchus anatinus</i>	Monotremata	ENSOANP00000008669	
	<i>Oryctolagus cuniculus</i>	Boreoeutheria	XP_002713990.1	
	<i>Otolemur garnettii</i>	Boreoeutheria	AAQR03059801.1	
<i>Pan troglodytes</i>	Boreoeutheria	XP_526970.2		
<i>Procvia capensis</i>	Afrotheria	ABRQ01101301.1		
<i>Pteropus vampyrus</i>	Boreoeutheria	ENSPVAP00000005752		
<i>Rattus norvegicus</i>	Boreoeutheria	NP_001020183.1		
<i>Sarcophilus harrisii</i>	Marsupialia	AFEY01228897.1		
<i>Taeniopygia guttata</i>	Sauropsida	ENSTGUP00000000950	Z	
<i>Trichechus manatus latirostris</i>	Afrotheria	AHIN01042750.1		
<i>Tursiops truncatus</i>	Boreoeutheria	ENSTTRP00000000995		
GIN2	<i>Callorhynchus milii</i>	Chondrichthyes	AAVX01272723.1	
	<i>Danio rerio</i>	Actinopterygii	CABZ01030983.1	
	<i>Gallus gallus</i>	Sauropsida	ENSGALT00000005860	
	<i>Latimeria chalumnae</i>	Coelacanthimorph a	ENSLACT00000020312	
	<i>Macropus eugenii</i>	Marsupialia	ABQO020016960.1	
	<i>Meleagris gallopavo</i>	Sauropsida	ENSMGAT00000003941	
	<i>Sarcophilus harrisii</i>	Marsupialia	AFEY01377517.1	
	<i>Taeniopygia guttata</i>	Sauropsida	ABQF01047089.1	
	<i>Takifugu rubripes</i>	Actinopterygii	CAAB02000649.1	
	<i>Xenopus tropicalis</i>	Amphibia	AAMC01042891.1	
GIN-like	<i>Branchiostoma floridae</i>	Cephalochordata	ABEP01009594	
	<i>Branchiostoma floridae</i>	Cephalochordata	ABEP02009093.1	

	<i>Ciona intestinalis</i>	Urochordata	ENSCINT00000034809	
	<i>Petromyzon marinus</i>	Cyclostomata	ENSPMAT00000009777	
	<i>Petromyzon marinus</i>	Cyclostomata	ENSPMAT00000009777	
SCAND3	<i>Ailuropoda melanoleuca</i>	Boreoeutheria	ACTA01148370.1	
	<i>Bos taurus</i>	Boreoeutheria	XP_002702938.1	
	<i>Callithrix jacchus</i>	Boreoeutheria	ACFV01153170.1	
	<i>Canis lupus familiaris</i>	Boreoeutheria	XP_545451.2	
	<i>Choloepus hoffmanni</i>	Xenarthra	ABVD01519353.1	
	<i>Dasybus novemcinctus</i>	Xenarthra	AAGV03013662.1	
	<i>Daubentonia madagascariensis</i>	Boreoeutheria	AGTM011946033.1	
	<i>Equus caballus</i>	Boreoeutheria	XP_001504928.1	
	<i>Felis catus</i>	Boreoeutheria	ACBE01158435.1	
	<i>Gorilla gorilla</i>	Boreoeutheria	CABD02313941.1	
	<i>Homo sapiens</i>	Boreoeutheria	NP_443155.1	6 (6p22.1)
	<i>Ictidomys tridecemlineatus</i>	Boreoeutheria	AGTP01117005.1	
	<i>Macaca mulatta</i>	Boreoeutheria	XP_001101327.1	
	<i>Macropus eugenii</i>	Marsupialia	ABQO020574066.1	
	<i>Mustela putorius furo</i>	Boreoeutheria	AGTQ01007431.1	
	<i>Nomascus leucogenys</i>	Boreoeutheria	ADFV01069104.1	
	<i>Otolemur garnettii</i>	Boreoeutheria	AAQR03175422.1	
	<i>Ovis aries</i>	Boreoeutheria	ACIV011864315.1	
	<i>Pan troglodytes</i>	Boreoeutheria	XP_527300.2	
	<i>Pongo abelii</i>	Boreoeutheria	XP_002816663.1	
	<i>Procavia capensis</i>	Afrotheria	ABRQ01339340.1	
	<i>Spermophilus tridecemlineatus</i>	Boreoeutheria	AAQQ01268141	
	<i>Sus scrofa</i>	Boreoeutheria	XP_003128285.1	
	<i>Trichechus manatus latirostris</i>	Afrotheria	AHIN01123797.1	
	<i>Tursiops truncatus</i>	Boreoeutheria	ABRN02152968.1	
KRBA2	<i>Ailuropoda melanoleuca</i>	Boreoeutheria	ACTA01016012.1	
	<i>Bos taurus</i>	Boreoeutheria	XP_002702194.1	
	<i>Callithrix jacchus</i>	Boreoeutheria	XP_002806845.1	
	<i>Canis lupus familiaris</i>	Boreoeutheria	XP_003434716.1	
	<i>Choloepus hoffmanni</i>	Xenarthra	ABVD01164029.1	
	<i>Dasybus novemcinctus</i>	Xenarthra	AAGV03120505.1	
	<i>Daubentonia madagascariensis</i>	Boreoeutheria	AGTM011803390.1	
	<i>Equus caballus</i>	Boreoeutheria	XP_001503262.2	
	<i>Felis catus</i>	Boreoeutheria	ACBE01571589.1	
	<i>Gorilla gorilla</i>	Boreoeutheria	CABD02146056.1	
	<i>Homo sapiens</i>	Boreoeutheria	NP_998762.1	17 (17p13.1)
	<i>Loxodonta africana</i>	Afrotheria	AAGU03065723.1 *	
	<i>Macaca mulatta</i>	Boreoeutheria	XP_001113012.1	
	<i>Microcebus murinus</i>	Boreoeutheria	ABDC01211585.1	
	<i>Mustela putorius furo</i>	Boreoeutheria	AEYP01050843.1	
	<i>Myotis lucifugus</i>	Boreoeutheria	AAPE02045206.1 *	
	<i>Nomascus leucogenys</i>	Boreoeutheria	XP_003274599.1	
	<i>Ovis aries</i>	Boreoeutheria	ACIV011623187.1	
	<i>Pan troglodytes</i>	Boreoeutheria	AACZ03107953.1	
	<i>Pongo abelii</i>	Boreoeutheria	NP_001127348.1	
	<i>Sarcophilus harrisii</i>	Marsupialia	AEFK01165105.1	
	<i>Sus scrofa</i>	Boreoeutheria	XP_003358333.1	
	<i>Trichechus manatus latirostris</i>	Afrotheria	AHIN01050211.1 *	
	<i>Trichosurus vulpecula</i>	Marsupialia	DY605310.1	
	<i>Vicugna pacos</i>	Boreoeutheria	ABRR01279825.1	
NYNRIN	<i>Homo sapiens</i>	Boreoeutheria	NP_079357.2	14 (14q12)
	<i>Mus musculus</i>	Boreoeutheria	NP_001035161.1	
	<i>Pongo abelii</i>	Boreoeutheria	XP_002824664.1	
	<i>Pan troglodytes</i>	Boreoeutheria	XP_509877.2	
	<i>Macaca mulatta</i>	Boreoeutheria	XP_001104789.2	
	<i>Equus caballus</i>	Boreoeutheria	ENSECAP00000014240	

<i>Canis lupus familiaris</i>	Boreoeutheria	XP_547747.3
<i>Oryctolagus cuniculus</i>	Boreoeutheria	XP_002718154.1
<i>Bos taurus</i>	Boreoeutheria	NP_001179388.1
<i>Monodelphis domestica</i>	Marsupialia	XP_001380281.1
<i>Loxodonta africana</i>	Afrotheria	XP_003421016.1
<i>Cavia porcellus</i>	Boreoeutheria	XP_003474331.1
<i>Myotis lucifugus</i>	Boreoeutheria	ENSMLUP00000010277
<i>Trichechus manatus latirostris</i>	Afrotheria	AHIN01147338.1
<i>Procuria capensis</i>	Afrotheria	ABRQ01414840.1
<i>Echinops telfairi</i>	Afrotheria	AAIY01153771.1
<i>Dasyus novemcinctus</i>	Xenarthra	AAGV03121121.1
<i>Choloepus hoffmanni</i>	Xenarthra	ABVD01872789.1
<i>Sarcophilus harrisii</i>	Marsupialia	AEFK01009009.1
<i>Macropus eugenii</i>	Marsupialia	ABQO020422001.1
<i>Pteropus vampyrus</i>	Boreoeutheria	ABRP01121463.1
<i>Felis catus</i>	Boreoeutheria	AANG02157131.1
<i>Tursiops truncatus</i>	Boreoeutheria	ABRN02279328.1
<i>Mustela putorius furo</i>	Boreoeutheria	AGTQ01027410.1
<i>Ailuropoda melanoleuca</i>	Boreoeutheria	ACTA01019458.1
<i>Gorilla gorilla</i>	Boreoeutheria	CABD02105976.1
<i>Callithrix jacchus</i>	Boreoeutheria	XP_002753733.1
<i>Nomascus leucogenys</i>	Boreoeutheria	XP_003260748.1
<i>Ictidomys tridecemlineatus</i>	Boreoeutheria	AGTP01099316.1
<i>Otolemur garnettii</i>	Boreoeutheria	AAQR03175878.1
<i>Microcebus murinus</i>	Boreoeutheria	ABDC01231164.1
<i>Heterocephalus glaber</i>	Boreoeutheria	EHB07434.1
<i>Tupaia belangeri</i>	Boreoeutheria	AAPY01734038.1
<i>Dipodomys ordii</i>	Boreoeutheria	ABRO01178620.1

Gene	Organism	Taxonomic group	Protein/nucleotide accession number	Chromosome (location)
ASPRV1	<i>Ailuropoda melanoleuca</i>	Boreoeutheria	ACTA01176775.1	
	<i>Bos taurus</i>	Boreoeutheria	DAAA02031529.1	
	<i>Callithrix jacchus</i>	Boreoeutheria	ACFV01110198.1	
	<i>Canis lupus familiaris</i>	Boreoeutheria	AAEX03007628.1	
	<i>Cavia porcellus</i>	Boreoeutheria	AAKN02036909.1	
	<i>Choloepus hoffmanni</i>	Xenarthra	ABVD01643553	
	<i>Dasyopus novemcinctus</i>	Xenarthra	AAGV03143624.1	
	<i>Equus caballus</i>	Boreoeutheria	AAWR02003737.1	
	<i>Felis catus</i>	Boreoeutheria	AANG02143111	
	<i>Gorilla gorilla</i>	Boreoeutheria	CABD02193978.1	
	<i>Heterocephalus glaber</i>	Boreoeutheria	AFSB01223045.1	
	<i>Homo sapiens</i>	Boreoeutheria	NP_690005.2	2 (2p13.3)
	<i>Ictidomys tridecemlineatus</i>	Boreoeutheria	AAQQ01029984.1	
	<i>Loxodonta africana</i>	Afrotheria	AAGU03051431.1	
	<i>Macaca mulatta</i>	Boreoeutheria	AANU01291061.1	
	<i>Macropus eugenii</i>	Marsupialia	ABQO021096366.1	
	<i>Microcebus murinus</i>	Boreoeutheria	ABDC01048367.1	
	<i>Monodelphis domestica</i>	Marsupialia	AAFR03004014.1	
	<i>Mus musculus</i>	Boreoeutheria	NP_080690.2	
	<i>Mustela putorius furo</i>	Boreoeutheria	AEYP01010392.1	
	<i>Myotis lucifugus</i>	Boreoeutheria	AAPE02025611.1	
	<i>Nomascus leucogenys</i>	Boreoeutheria	ADFV01010511.1	
	<i>Ochotona princeps</i>	Boreoeutheria	AAYZ01083901	
	<i>Ornithorhynchus anatinus</i>	Monotremata	AAPN01199678.1	
	<i>Oryctolagus cuniculus</i>	Boreoeutheria	AAGW02006848.1	
	<i>Otolemur garnettii</i>	Boreoeutheria	AAQR03102198.1	
	<i>Pan troglodytes</i>	Boreoeutheria	AADA01178871.1	
	<i>Pongo abelii</i>	Boreoeutheria	ABGA01353826.1	
	<i>Pteropus vampyrus</i>	Boreoeutheria	ABRP01166574.1	
	<i>Rattus norvegicus</i>	Boreoeutheria	EDL91253.1	
	<i>Sarcophilus harrisii</i>	Marsupialia	AFEY01388655.1	
	<i>Tursiops truncatus</i>	Boreoeutheria	ABRN02331053.1	
	<i>Vicugna pacos</i>	Boreoeutheria	ABRR01436695.1	

Gene	Organism	Taxonomic group	Protein/nucleotide accession number	Chromosome (location)
ARC				
	<i>Ailuropoda melanoleuca</i>	Boreoeutheria	ACTA01148197.1	
	<i>Anolis carolinensis</i>	Sauropsida	AAWZ02020354.1	
	<i>Bos taurus</i>	Boreoeutheria	NP_001193336.1	
	<i>Callithrix jacchus</i>	Boreoeutheria	ACFV01185911.1	
	<i>Canis lupus familiaris</i>	Boreoeutheria	AACN010440983.1	
	<i>Cavia porcellus</i>	Boreoeutheria	AAKN02023196.1	
	<i>Chrysemys picta bellii</i>	Sauropsida	AHGY01086810.1	
	<i>Dasyops novemcinctus</i>	Xenarthra	AAGV03311726.1	
	<i>Gallus gallus</i>	Sauropsida	NP_989763.1	
	<i>Gorilla gorilla</i>	Boreoeutheria	CABD02372626.1	
	<i>Heterocephalus glaber</i>	Boreoeutheria	AFSB01232674.1	
	<i>Homo sapiens</i>	Boreoeutheria	NP_056008.1	8 (8q24.3)
	<i>Ictidomys tridecemlineatus</i>	Boreoeutheria	AGTP01001239.1	
	<i>Loxodonta africana</i>	Afrotheria	AAGU03089166.1	
	<i>Macaca mulatta</i>	Boreoeutheria	AANU01107068.1	
	<i>Macropus eugenii</i>	Marsupialia	ABQO020225819.1	
	<i>Meleagris gallopavo</i>	Sauropsida	XP_003205366.1	
	<i>Melopsittacus undulatus budgerigar</i>	Sauropsida	AGAI01032183.1	
	<i>Monodelphis domestica</i>	Marsupialia	AAFR03005662.1	
	<i>Mus musculus</i>	Boreoeutheria	NP_061260.1	
	<i>Mustela putorius furo</i>	Boreoeutheria	AEYP01014255.1	
	<i>Nomascus leucogenys</i>	Boreoeutheria	ADFV01097265.1	
	<i>Ornithorhynchus anatinus</i>	Monotremata	AAPN01117397.1	
	<i>Otolemur garnettii</i>	Boreoeutheria	AAQR03184588.1	
	<i>Pan troglodytes</i>	Boreoeutheria	XP_528245.2	
	<i>Pongo abelii</i>	Boreoeutheria	ABGA01006600.1	
	<i>Procavia capensis</i>	Afrotheria	ABRQ01626709.1	
	<i>Pteropus vampyrus</i>	Boreoeutheria	ABRP01297506.1	
	<i>Python molurus</i>	Sauropsida	AEQU010333076.1	
	<i>Rattus norvegicus</i>	Boreoeutheria	NP_062234.1	
	<i>Saimiri boliviensis</i>	Boreoeutheria	AGCE01132459.1	
	<i>Sarcophilus harrisii</i>	Marsupialia	AFEY01455681	
	<i>Sorex araneus</i>	Boreoeutheria	AALT01329681.1	
	<i>Taeniopygia guttata</i>	Sauropsida	ABQF01048364.1	
	<i>Trichechus manatus latirostris</i>	Afrotheria	AHIN01125499.1	
	<i>Tursiops truncatus</i>	Boreoeutheria	ABRN02468085.1	
	<i>Xenopus tropicalis</i>	Amphibia	AAMC01034049.1	

* Incomplete/ pseudogene sequence

Supplementary Table S2. Distribution of Metaviridae clades in Tetrapoda.

Metaviridae clade	Sauropsida				Mammals		Ancestral states			
	Lepidosauria	Turtles	Archosauria (crocodiles)	Archosauria (birds)	Prototheria	Theria	Sauropsida	Synapsida	Amniota	Tetrapoda
Chromovirus	+	*	*	Δ	Δ	Δ	+	+	+	+
Cigr2	Δ	Δ	+	Δ	Δ	Δ	+	+	+	+
Barthez	Δ	+	+	Δ	Δ	Δ	+	+	+	+
Gmr1	+	+	+	Δ	Δ	Δ	+	+	+	+
new Mag	Δ	+	Δ	Δ	Δ	Δ	+	+	+	+
SURL	+	+	+	Δ	Δ	Δ	+	+	+	+
Mag	+	+	+	Δ	Δ	Δ	+	+	+	+

+: full length elements present, Δ: elements absent, *: corrupted elements (retroelement remains)

Supplementary Table S3. Diverse phenotypic roles of RDDGs.

Family	Gene	Gene/protein properties and/or function	References
SUSHI	<i>PEG10</i>	Paternally expressed. Essential for placenta development. Overexpressed in different carcinomas. Interacts with ALK1 (TGF-beta receptor) and SIAH1 (mediator of apoptosis).	<i>Ono et al. 2001; Okabe et al. 2003; Ono et al. 2006; Lux et al. 2005</i>
	<i>RGAG1</i>	Down-regulated in testicular cancer	<i>Cheung et al. 2010</i>
	<i>RGAG4</i>	Unknown	
	<i>RTL1</i>	Paternally expressed. Has maternally expressed antisense transcript coding for several miRNAs targeting the RTL1 transcript. RTL1 is essential for maintenance of the fetal capillaries and establishment of fetomaternal interface. Its loss or overproduction cause late fetal or neonatal lethality in mice.	<i>Seitz et al. 2003; Davis et al. 2005; Sekita et al. 2008</i>
	<i>ZCCHC5</i>	Unknown	
	<i>ZCCHC16</i>	Unknown	
	<i>LDOC1</i>	Negative regulator of nuclear factor kappa B (NF-κB) signal transduction pathway. Induces apoptosis. CNS co-expression interaction network hub gene.	<i>Nagasaki et al. 2003; Inoue et al. 2005, Oldham et al. 2006</i>
	<i>LDOC1L</i>	Unknown	
	<i>FAM127a/b/c</i>	Proliferation related gene (fam127a)	<i>Parisi et al. 2009</i>
	<i>C22orf29</i>	Unknown	
	<i>SIRH12</i>	Unknown	
	PNMA	<i>PNMA1</i>	Neuronal pro-apoptotic protein
<i>PNMA2</i>		Unknown	
<i>PNMA3</i>		Unknown	
<i>MOAP1</i>		Induction of apoptosis. Interacts with BAX, BCL2, BCL2L1 and RASSF1A.	<i>Tan et al. 2001; Baksh et al. 2005</i>
<i>PNMA5</i>		Enriched expression in prefrontal and sensory association areas of neocortex.	<i>Takaji et al. 2009</i>
<i>PNMA6a/b</i>		Unknown	
<i>ZCCHC12</i>		Transcriptional co-activator of BMP signaling. Interacts with CBP. ZCCHC12 localizes to PML nuclear bodies.	<i>Cho et al. 2008; Cho et al. 2009</i>
<i>ZCCHC18</i>		Unknown	
<i>PNMAL1</i>		Up-regulated in human spermatogonia and mouse gonocytes cells	<i>Wu et al. 2009</i>
<i>PNMAL2</i>		Unknown	
<i>CCDC8</i>		Interacts with OBSL1. Mutations in CCDC8 cause 3-M syndrome. Involved in the growth control pathway in mammals. Localizes at plasma membrane and neurite tips. Overexpression increases the number of neurites per cell. Interacts with p53. Inactivation of CCDC8 down-regulates p53-mediated PUMA activation upon DNA damage. Interacts with Tip60 acetyltransferase and promotes Tip60-mediated	<i>Laketa et al. 2006; Hanson et al. 2011; Dai et al. 2011; Drucker et al. 2009</i>

acetylation of p53 at K120.

ARC	<i>ARC</i>	Modulates synaptic plasticity. Involved in the process of consolidation of long-term potentiation (LPT) and long-term depression (LTD) through modulation of actin cytoskeletal dynamics and regulation of AMPA-type glutamate receptor endocytosis, respectively. Essential for long-term memory and learning.	<i>Lyford et al. 1995; Plath et al. 2006; Shepherd et al. 2006; Chowdhury et al. 2006; Korb and Finkbeiner 2011</i>
RVE	<i>GIN1/2</i> <i>NYNRIN</i> <i>SCAND3</i> <i>KRAB2</i>	Unknown Unknown Down-regulated during mouse embryonic stem cell (ES) differentiation Unknown	<i>Makeyev and Bayarsaihan 2009</i>
PRO	<i>ASPRV1</i>	Aspartic protease expressed in epidermis. It is involved in the processing of profilaggrin and maintaining the texture and hydration of the stratum corneum.	<i>Bernard et al. 2005; Matsui et al. 2011</i>

Supplementary Table S4. Structure and properties of RDDGs.

Gene	Organism	Protein length	Transcript length	Introns (coding)	Introns (5'/3' UTR)	Gene structure	-1 frame shift
PEG10	<i>H. sapiens</i>	708	6628	0	1/0	Cpd-Zf-RVP	Yes
RGAG1	<i>H. sapiens</i>	1388	5426	1	2/0	Cpd	No
RGAG4	<i>H. sapiens</i>	569	4339	0	0/1	Cpd	No
RTL1	<i>H. sapiens</i>	1358	4319	0	0/0	Cpd-RVP-RT	No
ZCCHC5	<i>H. sapiens</i>	475	2648	0	1/0	Cpd-Zf	No
ZCCHC16	<i>H. sapiens</i>	310	2958	0	2/0	Cpd-Zf	No
LDOC1	<i>H. sapiens</i>	146	1370	0	0/0	N-terminal Cpd	No
LDOC1L	<i>H. sapiens</i>	239	5495	0	1/0	N-terminal Cpd	No
FAM127a	<i>H. sapiens</i>	113	1236	0	0/0	N-terminal Cpd	No
FAM127b	<i>H. sapiens</i>	113	1244	0	0/0	N-terminal Cpd	No
FAM127c	<i>H. sapiens</i>	113	2017	0	0/0	N-terminal Cpd	No
C22orf29	<i>H. sapiens</i>	364	6619	0	2/0	N-terminal Cpd	No
SIRH12	<i>M. eugenii</i>	107	N/A	0	N/A	N-terminal Cpd	No
PNMA1	<i>H. sapiens</i>	353	2635	0	0/0	Mtx-Cpd	No
PNMA2	<i>H. sapiens</i>	364	4950	0	2/0	Mtx-Cpd	No
PNMA3	<i>H. sapiens</i>	455	3630	1	1/0	Mtx-Cpd-Zf	Yes
MOAP1	<i>H. sapiens</i>	351	2441	0	2/0	Mtx-Cpd	No
PNMA5	<i>H. sapiens</i>	448	3197	0	1-3/0	Mtx-Cpd	Yes
PNMA6a/b	<i>H. sapiens</i>	399	2236	0	1/0	Mtx-Cpd	No
ZCCHC12	<i>H. sapiens</i>	402	2231	0	3/0	Cpd-Zf	No
ZCCHC18	<i>H. sapiens</i>	403	3045	0	2/0	Cpd-Zf	No
PNMAL1	<i>H. sapiens</i>	439	3689	1	1/0	Mtx	No
PNMAL2	<i>H. sapiens</i>	279	1726	1	0/0	Mtx	No
CCDC8	<i>H. sapiens</i>	538	3213	0	0/0	C-terminal Mtx	No
M-PNMA	<i>M. eugenii</i>	458	N/A	0	N/A	Mtx-Cpd-Zf	?
ARC	<i>H. sapiens</i>	396	2943	0	0/2	Mtx-Cpd	No
ASPRV1	<i>H. sapiens</i>	343	2172	0	0/0	RVP	No
GIN1	<i>H. sapiens</i>	522	3229	6	1/0	Zf-INT	No
GIN2	<i>G. gallus</i>	422	1809	7	?/0	INT	No
NYNRIN	<i>H. sapiens</i>	1898	7857	7	1/0	NYN-INT	No
KRBA2	<i>H. sapiens</i>	492	1964	1	0/0	KRAB-INT	No
SCAND3	<i>H. sapiens</i>	1325	4877	3	0/0	SCAN-INT-hAT	No

Cpd: Capsid domain, Zf: Zinc finger, RVP: Retroviral aspartyl protease, RT: reverse transcriptase, Mtx: Matrix domain, INT: integrase, NYN: NYN domain, KRAB: Kruppel associated box, SCAN: SCAN domain hAT: hAT family dimerisation domain

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