

Supplementary Information

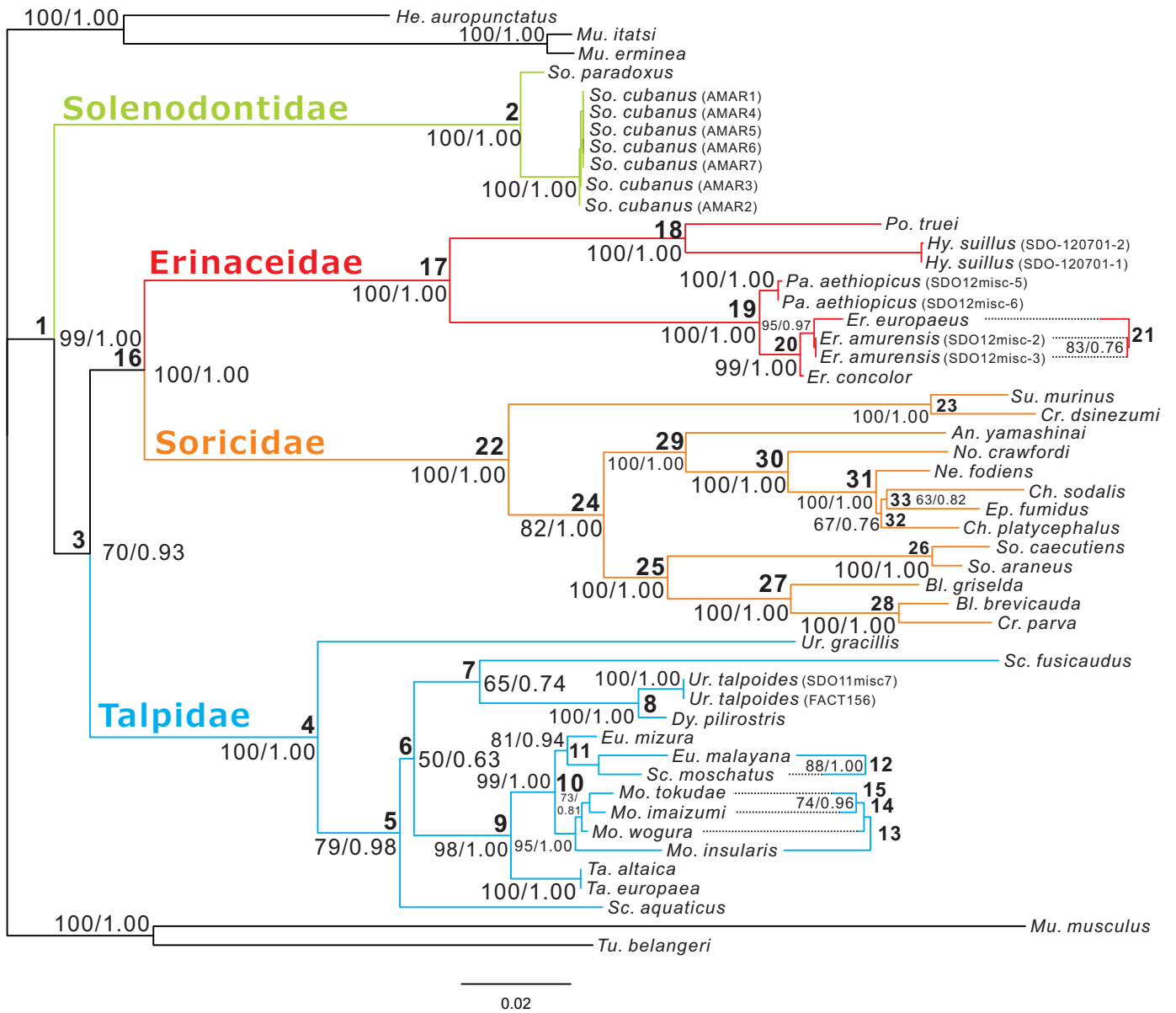
Molecular phylogenetic analysis of nuclear genes suggests a Cenozoic over-water dispersal origin for the Cuban solenodon

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Supplementary Figure S1

Maximum likelihood tree of the order Eulipotyphla. The tree was estimated from the GARLI analysis and the negative log-likelihood score was -31415.497726. Intraspecific variations are shown where relevant. The colours of each branch show four families in this order (green, Solenodontidae; blue, Talpidae, red, Erinaceidae; orange, Soricidae). Numbers near each node show bootstrap supports (before slash) and posterior probabilities (after slash) from the ML and BI analyses, respectively. Numbers in bold near each node are node-numbers, which correspond to those in Supplementary Table S2.

Supplementary Figure S1



Supplementary Table S1. Species and DNA sequences examined in this study

Taxon ^a	Voucher number and locality ^b	Accession numbers in the DNA databases				
		<i>Apob</i>	<i>Atp7a</i>	<i>Bdnf</i>	<i>Brcal</i>	<i>Ragl</i>
Solenodontidae						
<i>Solenodon cubanus</i> , Cuban solenodon or Almiqui	AMAR1: AHNP ^c , Cuba	LC124826 ^d	LC124853 ^d	LC124882 ^d	LC124915 ^d	LC124949 ^d
<i>Solenodon cubanus</i> , Cuban solenodon or Almiqui	AMAR2: AHNP ^c , Cuba	LC124827 ^d	LC124854 ^d	LC124883 ^d	LC124916 ^d	LC124950 ^d
<i>Solenodon cubanus</i> , Cuban solenodon or Almiqui	AMAR3: AHNP ^c , Cuba	LC124828 ^d	LC124855 ^d	LC124884 ^d	LC124917 ^d	LC124951 ^d
<i>Solenodon cubanus</i> , Cuban solenodon or Almiqui	AMAR4: AHNP ^c , Cuba	LC124829 ^d	LC124856 ^d	LC124885 ^d	LC124918 ^d	LC124952 ^d
<i>Solenodon cubanus</i> , Cuban solenodon or Almiqui	AMAR5: AHNP ^c , Cuba	LC124830 ^d	LC124857 ^d	LC124886 ^d	LC124919 ^d	LC124953 ^d
<i>Solenodon cubanus</i> , Cuban solenodon or Almiqui	AMAR6: AHNP ^c , Cuba	LC124831 ^d	LC124858 ^d	LC124887 ^d	LC124920 ^d	LC124954 ^d
<i>Solenodon cubanus</i> , Cuban solenodon or Almiqui	AMAR7: AHNP ^c , Cuba	LC124832 ^d	LC124859 ^d	LC124888 ^d	LC124921 ^d	LC124955 ^d
<i>Solenodon paradoxus</i> , Hispaniolan solenodon	From Database	JN414026 ^e	AY530069 ^h	AY530070 ^h	AY530080 ^h	-
Erinaceidae						
Erinaceinae						
<i>Erinaceus amurensis</i> , Amur hedgehog	SDO12misc-2: Shizuoka, Japan	LC124833 ^d	LC124860 ^d	LC124889 ^d	LC124922 ^d	LC124956 ^d
<i>Erinaceus amurensis</i> , Amur hedgehog	SDO12misc-3: Shizuoka, Japan	LC124834 ^d	LC124861 ^d	LC124890 ^d	LC124923 ^d	LC124957 ^d
<i>Erinaceus europaeus</i> , West European hedgehog	From Database	JN414024 ^e	-	-	AF284008 ^l	-
<i>Erinaceus concolor</i> , southern white-breasted hedgehog	From Database	-	AY011383 ⁱ	AY011447 ⁱ	-	AY011871 ⁱ
<i>Paraechinus aethiopicus</i> , desert hedgehog	QU1: northern Qatar	LC124835 ^d	LC124862 ^d	LC124891 ^d	LC124924 ^d	LC124958 ^d
<i>Paraechinus aethiopicus</i> , desert hedgehog	QU2: northern Qatar	LC124836 ^d	LC124863 ^d	LC124892 ^d	LC124925 ^d	LC124959 ^d
Galericinae						
<i>Hylomys cf. suillus</i> , short-tailed gymnure	SDO-120701-1*: northern Vietnam	LC124837 ^d	-	LC124893 ^d	LC124926 ^d	LC124960 ^d
<i>Hylomys cf. suillus</i> , short-tailed gymnure	SDO-120702-2*: northern Vietnam	LC124838 ^d	-	LC124894 ^d	LC124927 ^d	LC124961 ^d
<i>Podogymnura truei</i> , Mindanao gymnure	From Database	JN414025 ^e	JN633737 ^e	JN633375 ^e	-	-
Soricidae						
Crocidurinae						
<i>Crocidura dsinezumi</i> , dsinezumi shrew	SDO-11/02/23-2: Yakushima Is., Japan	-	LC124864 ^d	LC124895 ^d	LC124928 ^d	LC124962 ^d
<i>Suncus murinus</i> , Asian house shrew	SDO-11/12/7-1: Yonaguni Is., Japan	-	LC124865 ^d	LC124896 ^d	LC124929 ^d	LC124963 ^d
Soricinae						
<i>Anourosorex yamashinai</i> , Taiwanese mole shrew	SDO-03/3/12-5: Chiayi Country, Taiwan	LC124839 ^d	LC124866 ^d	LC124897 ^d	LC124930 ^d	-
<i>Blarina brevicauda</i> , northern short-tailed shrew	SDO-2002/7/25-5: Michigan, USA	LC124840 ^d	LC124867 ^d	LC124898 ^d	LC124931 ^d	LC124964 ^d

<i>Blarinella griselda</i> , Indochinese short-tailed shrew	AMNH101610: Mt. Tay Con Linh, Vietnam	LC124841 ^d	LC124868 ^d	LC124899 ^d	LC124932 ^d	LC124965 ^d
<i>Chimarrogale platycephalus</i> , Japanese water shrew	SDO-2001/5/25-1: Aomori Pref., Japan	LC124842 ^d	LC124869 ^d	LC124900 ^d	LC124933 ^d	-
<i>Chodsigoa sodalis</i> , lesser Taiwanese shrew	SDO-02misc74: Chiayi Country, Taiwan	-	LC124870 ^d	LC124901 ^d	LC124934 ^d	-
<i>Cryptotis parva</i> , North American least shrew	ASNHC8192: Texas, USA	LC124843 ^d	-	LC124902 ^d	LC124935 ^d	LC124966 ^d
<i>Episoriculus fumidus</i> , Taiwanese brown-toothed shrew	SDO-03/3/11-1: Chiayi Country, Taiwan	-	LC124871 ^d	LC124903 ^d	LC124936 ^d	-
<i>Neomys fodiens</i> , Eurasian water shrew	SDO95misc-20: Koverhar, S Finland	-	LC124872 ^d	LC124904 ^d	LC124937 ^d	-
<i>Notiosorex crawfordi</i> , Crawford's gray shrew	ASNHC10653: Texas, USA	LC124844 ^d	LC124873 ^d	LC124905 ^d	LC124938 ^d	LC124967 ^d
<i>Sorex araneus</i> , common shrew	From Database	JN414027 ^e	AY011386 ⁱ	AY011450 ⁱ	AY057828 ⁱ	-
<i>Sorex caecutiens</i> , Laxmann's shrew	SDO-100825-1: Hokkaido, Japan	LC124845 ^d	LC124874 ^d	LC124906 ^d	LC124939 ^d	LC124968 ^d
Talpidae						
Scalopinae						
<i>Scalopus aquaticus</i> , eastern mole	From Database	-	-	-	AF284007 ¹	-
Talpinae						
<i>Scaptonyx fuscicaudus</i> , long-tailed mole	From Database	-	-	-	-	AB106241 ^m
<i>Euroscaptor klossi</i> , Kloss's mole	From Database	-	-	-	-	AB185155 ⁿ
<i>Euroscaptor mizura</i> , Japanese mountain mole	SDO-2001/5/26-2: Aomori, Japan	LC124846 ^d	LC124875 ^d	LC124907 ^d	LC124940 ^d	LC124969 ^d
<i>Mogera imaizumii</i> , small Japanese mole	From Database	-	-	-	-	AB106242 ^m
<i>Mogera insularis</i> , insular mole	From Database	-	-	-	-	AB176544 ^m
<i>Mogera tokudae</i> , Sado mole	From Database	-	-	-	-	AB106243 ^m
<i>Mogera wogura</i> , Japanese mole	SDO-11/02/24-2: Yakushima Is., Japan	LC124847 ^d	LC124876 ^d	LC124908 ^d	LC124941 ^d	LC124970 ^d
<i>Scaptochirus moschatus</i> , short-faced mole	From Database	-	-	-	-	AB353298 ^o
<i>Talpa altaica</i> , Altai mole	From Database	JN414028 ^e	HG738086 ^j	AY011448 ⁱ	-	AB176542 ^m
<i>Talpa europaea</i> , European mole	From Database	AY243373 ^f	-	-	-	-
<i>Dymecodon pilirostris</i> , True's shrew mole	SDO-96misc-8: Nagano, Japan	LC124848 ^d	LC124877 ^d	LC124909 ^d	LC124942 ^d	LC124971 ^d
<i>Urotrichus talpoides</i> , Japanese shrew mole	SDO11misc7: Okayama, Japan	-	LC124878 ^d	LC124910 ^d	LC124943 ^d	LC124972 ^d
<i>Urotrichus talpoides</i> , Japanese shrew mole	FACT156: Fukuyama, Hiroshima, Japan	-	-	-	LC124944 ^d	LC124973 ^d
Uropsilinae						
<i>Uropsilus gracilis</i> , gracile shrew mole	From Database	-	-	-	-	AB106240 ^m
Outgroups						
<i>Herpestes auropunctatus</i> , small Asian mongoose	SDO-12/8/23-2: Grande Comore Island	LC124849 ^d	-	LC124911 ^d	LC124945 ^d	LC124974 ^d

<i>Mustela erminea</i> , ermine or stoat	From Database	AB193414 ^g EF987575 ^k EF987619 ^k AB285357 ^g AB109347 ^p
<i>Mustela itatsi</i> , Japanese weasel	SDO-11misc5: Yakushima Is., Japan	LC124850 ^d LC124879 ^d LC124912 ^d LC124946 ^d LC124975 ^d
<i>Mus musculus</i> , house mouse	SDO-11/02/24-4: Yakushima Is., Japan	LC124851 ^d LC124880 ^d LC124913 ^d LC124947 ^d LC124976 ^d
<i>Tupaia belangeri</i> , northern treeshrew	SDO-13/01/16-1*: southern Vietnam	LC124852 ^d LC124881 ^d LC124914 ^d LC124948 ^d -

^a: Scientific and common names follow Hutterer (2005).

^b: Voucher and locality information are provided for new data only (AMAR, collections in the project named Academic Mission of Almiquri Research; SDO, Satoshi D. Ohdachi's personal collections; QU, Qatar University; AMNH, American Museum of Natural History; ASNHC, Angelo State Natural History Collections; FACT, Fukuyama University Animal Cell Technology). *Samples are deposited at Institute of Ecology and Biological Resources, Vietnam

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^d: this study

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Supplementary Table S2. Time to the most recent common ancestor (TMRCA) and 95 Credibility interval of each clade in the eulipotyphlan phylogeny (Supplementary Fig. 1)

clade	TMRCA (MYA)		
	strategy [1]	strategy [2]	strategy [3]
1_Eulipotyphla	58.6 (57.3-60.8)	75.7 (74.5-76.9)	75.9 (74.7-77.1)
2_Solenodontidae	3.7 (2.6-5.0)	4.8 (3.3-6.4)	4.6 (3.1-6.0)
3_Talpidae-Soricidae-Erinaceidae	58.6 (57.3-60.8)	74.2 (64.4-77.4)*(64)	75.9 (74.7-77.1)
4_Talpidae	35.4 (34.2-38.5)*(137)	36.2 (34.2-43.2)*(121)	29.3 (20.3-42.9)*(114)
5_Talpinae-Scalopinae	35.0 (34.3-35.9)	35.1 (34.3-36.1)	23.7 (19.3-28.6)*(193)
6_Talpinae	19.8 (16.1-23.5)	25.2 (20.9-29.2)	21.7 (17.9-25.1)
7_Scaptonyx-Dimecodon-Urotrichus	14.3 (8.0-20.5)*(188)	18.2 (9.9-26.2)*(183)	17.8 (10.0-24.7)*(147)
8_Dimecodon-Urotrichus	2.3 (1.3-3.5)	2.9 (1.5-4.4)	2.7 (1.6-4.1)
9_Talpa-Mogera-Eurosaotor-Scaptochirus	7.1 (5.2-9.2)	9.0 (6.7-11.8)	8.5 (6.2-11.0)
10_Mogera-Eurosaotor-Scaptochirus	3.7 (2.5-5.1)	4.8 (3.2-6.5)	4.5 (3.0-6.1)
11_Eurosaotor-Scaptochirus	2.9 (1.2-4.8)	3.7 (1.3-5.9)	3.4 (1.3-5.7)*(192)
12_E.malayana-S.moschatus	1.7 (0.4-3.2)	2.2 (0.4-4.1)	2.1 (0.5-3.8)
13_Mogera	2.0 (0.9-3.3)	2.6 (1.0-4.3)	2.3 (0.8-4.0)
14_M.imaizumi-M.tokudae-M.wogura	1.4 (0.3-2.6)	1.8 (0.5-3.4)	1.7 (0.3-3.1)
15_M.imaizumi-M.tokudae	0.8 (0.1-1.7)	1.0 (0.1-2.3)	1.0 (0.1-2.1)
16_Erinaceidae-Soricidae	58.5 (57.3-60.4)	73.0 (59.6-77.3)*(63)	75.9 (74.7-77.1)
17_Erinaceidae	39.6 (38.1-41.5)	41.4 (38.4-45.0)	40.3 (35.0-46.0)
18_Galericinae	18.7 (13.6-24.0)	21.3 (15.9-26.5)	20.6 (15.1-26.4)
19_Erinaceinae	3.9 (2.9-5.1)	4.9 (3.6-6.4)	4.7 (3.3-6.1)
20_Erinaceus	1.1 (0.6-1.8)	1.4 (0.7-2.1)	1.3 (0.7-2.0)
21_E.amurensis-E.europaeus	1.0 (0.6-1.6)	1.3 (0.7-1.9)	1.2 (0.7-1.8)
22_Soricidae	34.3 (29.9-38.5)	44.1 (36.8-50.4)*(105)	48.0 (42.3-53.8)
23_Crociturinae	6.0 (4.0-8.0)	7.8 (5.2-10.3)	7.9 (5.6-10.4)
24_Soricinae	26.5 (23.5-29.7)*(124)	34.0 (29.6-38.1)*(99)	35.0 (31.3-38.7)
25_B.brevicauda-C.parva-B.griselda-Sorex	22.5 (19.6-25.5)*(152)	28.9 (24.8-32.9)*(111)	30.0 (26.3-33.5)
26_Sorex	3.4 (2.2-4.9)	4.3 (2.8-6.0)	4.2 (2.7-5.8)
27_B.brevicauda-C.parva-B.griselda	12.8 (10.4-15.4)	16.4 (13.4-19.5)	16.6 (13.6-19.5)
28_B.brevicauda-C.parva	5.8 (4.2-7.5)	7.3 (5.3-9.4)	7.3 (5.4-9.3)
29_C.sodalis-E.fumidus-C.platycephalus-N.fodiens-N.crawfordi-A.yamashinai	21.3 (18.5-24.4)*(165)	27.3 (23.4-31.2)*(141)	27.9 (24.2-31.8)
30_C.sodalis-E.fumidus-C.platycephalus-N.fodiens-N.crawfordi	14.6 (12.2-17.3)*(186)	18.4 (15.4-21.5)	18.5 (15.4-21.5)
31_C.sodalis-E.fumidus-C.platycephalus-N.fodiens	8.5 (6.7-10.5)*(153)	10.6 (8.4-12.9)*(163)	10.4 (8.2-12.7)*(175)
32_C.sodalis-E.fumidus-C.platycephalus	8.3 (6.5-10.3)*(160)	10.3 (8.1-12.7)*(172)	10.1 (7.9-12.3)*(187)
33_C.sodalis-E.fumidus	8.0 (6.0-10.0)*(188)	10.0 (7.5-12.5)	9.8 (7.4-12.3)

*: ESS < 200 and each ESS is shown in the parenthesis after each asterisk

Supplementary Table S3. Primers adopted in the PCR and DNA sequencing.

Gene	Primers		Sequence (5' to 3')	References
	Name	1st/2nd PCR Forward/Reverse		
<i>ApoB</i>	187F	1st and 2nd Forward	GTG CCA GGT TCA ATC AGT ATA AGT	Amrine-Madsen et al. (2003)
	APOB-F9214-Eri	2nd Forward	CCA GCT CTG GGA AAC ATT ACC TG	this study
	APOB-F9287	2nd Forward	TAT AAC CAG TCA GAT ATT GTT GCT	Sato et al. (2006)
	APOB-F8830-Sori	2nd Forward	CAG GCA AGT TGA GAA AGT CAG	this study
	APOB-R8922-Sori	2nd Reverse	GCC TGG AAT TTG AAA GGT CCT TGG	this study
	APOB-R9324	2nd Reverse	GGT GCC CTC TAA TTT GTA CTG CAG	Sato et al. (2006)
	APOB-R9600-Eri	2nd Reverse	CCT GTG GCA GTG GTG TAC ACT CT	this study
	J1R	1st and 2nd Reverse	CCA GCA AAA TTT TCT TTT ACT TCA A	Jiang et al. (1998)
<i>Atp7a</i>	ATP7A-Fw	1st Forward	TCC CTG GAC AAT CAA GAA GC	Murphy et al. (2001)
	ATP7A-Rv	1st Reverse	AAG GTA GCA TCA AAT CCC ATG T	Murphy et al. (2001)
<i>Bdnf</i>	BDNF-Fw	1st Forward	CAT CCT TTT CCT TAC TAT GGT T	Murphy et al. (2001)
	BDNF-Rv	1st Reverse	TTC CAG TGC CTT TTG TCT ATG	Murphy et al. (2001)
<i>Brca1</i>	BRCA1-F997	1st and 2nd Forward	GAG AAC AGC AGT TTA TTA CTC AC	Sato et al. (2009)
	BRCA1-F1428	2nd Forward	AGA CTT AAT GGC CAG TGA TCC TC	Sato et al. (2009)
	BRCA1-R1509	2nd Reverse	AGG CTT GCC TTC CTC CGA TAG GT	Sato et al. (2009)
	BRCA1-R2047	1st and 2nd Reverse	CAT CTC TTC ACT GCT AGA ACA AC	Sato et al. (2009)
<i>Rag1</i>	RAG1-F1842	1st and 2nd Forward	GCT TTG ATG GAC ATG GAA GAA GAC AT	Teeling et al. (2000, their RAG1F1705)
	RAG1-F2357	2nd Forward	AGC CTC CCA AAA TCT TGT CTT CCA CTC CA	Sato et al. (2004)
	RAG1-F2357-Cro	2nd Forward	GGCCTCGCAGAATCTGGTCTTCCATTCCA	this study
	RAG1-R2388-CroEri	2nd Reverse	GGG TTG GAA CGC CAG ACC TCA TAG C	this study
	RAG1-R2486	2nd Reverse	AAT GTC ACA GTG AAG GGC ATC TAT GGA AGG	Sato et al. (2004)
	RAG1-R2951	1st and 2nd Reverse	GAG CCA TCC CTC TCA ATA ATT TCA GG	Teeling et al. (2000, their RAG1R2864)