

Table S1
A list of Deuterostomia genomes that were analyzed

Species name	Taxonomic group	Completeness of the genome data	Location of the genome data
<i>Strongylocentrotus purpuratus</i>	Echinodermata	Complete	WGS
<i>Ciona intestinalis</i>	Urochordata	Complete	WGS
<i>Ciona savignyii</i>	Urochordata	Complete	WGS
<i>Branchiostoma floridae</i>	Cephalochordata	Complete, not assembled yet	TraceDb
<i>Petromyzon marinus</i>	Cyclostomata	Partial (2.4 million sequence traces)	TraceDb
<i>Squalus acanthias</i>	Chondrichthyes	Partial (7 BAC clones)	HTGS
<i>Ginglymostoma cirratum</i>	Chondrichthyes	Partial (10 BAC clones)	HTGS
<i>Danio rerio</i>	Teleostei	Complete	WGS
<i>Takifugu rubripes</i>	Teleostei	Complete	WGS
<i>Tetraodon nigroviridis</i>	Teleostei	Complete	WGS
<i>Oryzias latipes</i>	Teleostei	Complete, not assembled yet	NIG
<i>Gasterosteus aculeatus</i>	Teleostei	Complete	WGS
<i>Latimeria menadoensis</i>	Coelacanthimorpha	Partial (8 BAC clones)	HTGS
<i>Xenopus tropicalis</i>	Amphibia	Complete	Ensembl
<i>Sphenodon punctatus</i>	Sauropsida, Lepidosauria	Partial (11 BAC clones)	HTGS
<i>Gopherus agassizii</i>	Sauropsida, Testudines	Partial (7 BAC clones)	HTGS
<i>Alligator mississippiensis</i>	Sauropsida, Archosauria, Crocodylia	Partial (21 BAC clones)	HTGS
<i>Galus gallus</i>	Sauropsida, Archosauria, Aves	Complete	WGS
<i>Ornithorhynchus anatinus</i>	Mammalia, Monotremata	Complete, not assembled yet	TraceDb
<i>Monodelphis domestica</i>	Mammalia, Metatheria	Complete	WGS
<i>Loxodonta africana</i>	Mammalia, Eutheria, Afrotheria	Complete	WGS
<i>Echinops telfairi</i>	Mammalia, Eutheria, Afrotheria	Complete	WGS
<i>Dasybus novemcinctus</i>	Mammalia, Eutheria, Xenarthra	Complete	WGS
<i>Canis familiaris</i>	Mammalia, Eutheria, Laurasiatheia	Complete	WGS
<i>Felis catus</i>	Mammalia, Eutheria, Laurasiatheia	Complete, not assembled yet	TraceDb

<i>Bos taurus</i>	Mammalia, Eutheria, Laurasiatheia	Complete	WGS
<i>Sorex araneus</i>	Mammalia, Eutheria, Laurasiatheia	Complete	WGS
<i>Erinaceus europaeus</i>	Mammalia, Eutheria, Laurasiatheia	Complete	WGS
<i>Myotis lucifugus</i>	Mammalia, Eutheria, Laurasiatheia	Complete, not assembled yet	TraceDb
<i>Sus scrofa</i>	Mammalia, Eutheria, Laurasiatheia	Complete, not assembled yet	TraceDb
<i>Rattus norvegicus</i>	Mammalia, Eutheria, Euarchontoglires	Complete	WGS
<i>Mus musculus</i>	Mammalia, Eutheria, Euarchontoglires	Complete	WGS
<i>Spermophilus tridecemlineatus</i>	Mammalia, Eutheria, Euarchontoglires	Complete, not assembled yet	TraceDb
<i>Cavia porcellus</i>	Mammalia, Eutheria, Euarchontoglires	Complete	WGS
<i>Oryctolagus cuniculus</i>	Mammalia, Eutheria, Euarchontoglires	Complete	WGS
<i>Tupaia belangeri</i>	Mammalia, Eutheria, Euarchontoglires	Complete, not assembled yet	TraceDb
<i>Homo sapiens</i>	Mammalia, Eutheria, Euarchontoglires	Complete	WGS
<i>Pan troglodytes</i>	Mammalia, Eutheria, Euarchontoglires	Complete	WGS
<i>Macaca mulatta</i>	Mammalia, Eutheria, Euarchontoglires	Complete	WGS
<i>Pongo pygmaeus</i>	Mammalia, Eutheria, Euarchontoglires	Complete, not assembled yet	TraceDb
<i>Otolemur garnettii</i>	Mammalia, Eutheria, Euarchontoglires	Complete, not assembled yet	TraceDb
<i>Callithrix jacchus</i>	Mammalia, Eutheria, Euarchontoglires	Complete, not assembled yet	TraceDb

All other vertebrate species analyzed (mostly mammals) were obtained at the HTGS Db of NCBI and are part of the largest ongoing project at NISC (<http://www.nisc.nih.gov>) that involves the generation of genomic sequences from 66 species of vertebrates for comparative genomic analyses.

Table S2

PCR analysis of L1 retrotransposons from a lungfish (Dipnoi), Amphibia and Reptilia.

Class	Order	Suborder	Family	Species	PCR	Number of sequenced clones
Dipnoi	Ceratodontiformes		Ceratodontidae	<i>Neoceratodes forsteri</i>	+	4
Amphibia	Gymnophiona		Caeciliidae	<i>Typhlonectes natans</i>	+	4
	Anura	Archeobatrachia	Bombinatoridae	<i>Bombina bombina</i>	-	-
		Mesobatrachia	Pipidae	<i>Xenopus sp.</i>	+	-
		Neobatrachia	Bufonidae	<i>Bufo bufo</i>	-	-
				<i>Bufo viridis</i>	-	-
			Ranidae	<i>Rana temporaria</i>	+	3
				<i>Rana dalmatina</i>	+	6
				<i>Rana ridibunda</i>	+	-
			Hylidae	<i>Hyla arborea</i>	+	6
	Caudata		Salamandridae	<i>Salamandra</i>	-	-

				<i>salamandra</i>		
				<i>Triturus alpestris</i>	+	1
				<i>Triturus cristatus</i>	+	4
			Proteidae	<i>Proteus anguinus</i>	+	5
				<i>Necturus lewisi</i>	+	3
Reptilia	Squamata	Serpentes	Viperidae	<i>Vipera ammodytes</i>	+	4
				<i>Vipera palaestinae</i>	+	3
				<i>Echis coloratus</i>	+	4
				<i>Crotalus horridus</i>	+	3
				<i>Bothrops alternatus</i>	+	3
			Elapidae	<i>Walterinnesia aegyptia</i>	+	3
				<i>Notechis scutatus</i>	+	4
			Colubridae	<i>Natrix tessellata</i>	+	4
				<i>Clelia rustica</i>	+	-
			Boidae	<i>Boa constrictor</i>	+	4

			<i>Python molurus</i>	+	1
	Sauria	Lacertidae	<i>Podarcis muralis</i>	+	5
		Teiidae	<i>Tupinambis teguixin</i>	-	-
		Anguidae	<i>Anguis fragilis</i>	+	-
Crocodylia	Eusuchia	Crocodylidae	<i>Alligator</i> <i>mississippiensis</i>	-	-
			<i>Caiman latirostris</i>	-	-
Testudines	Cryptodira	Emydidae	<i>Trachemys scripta</i> <i>elegans</i>	-	-
		Testudinidae	<i>Geochelone chilensis</i>	-	-

Table S3

L1 retrotransposon repertoires in completed Deuterostomia genomes

Taxonomic group	Species	Total number of L1 families	Copy numbers	L1 group A families	L1 group B families	L1 group C families
Echinodermata	<i>Strongylocentrotus purpuratus</i>	15	low	15	0	0
Urochordata	<i>Ciona intestinalis</i>	5	low	5	0	0
	<i>C. savignyi</i>	6	low	6	0	0
Cephalochordata	<i>Branchiostoma floridae</i>	40	low	40	0	0
Cyclostomata	<i>Petromyzon marinus</i>	0	?	0	0	0
Actinopterygii	<i>Tetraodon nigroviridis</i>	0	0	0	0	0
	<i>Takifugu rubripes</i>	1	low	0	1	0
	<i>Gasterosteus aculeatus</i>	0	0	0	0	0
	<i>Oryzias latipes</i>	17	low	4	11	2
	<i>Danio rerio</i>	59	Low to	18	32	9

			moderate			
Amphibia	<i>Xenopus tropicalis</i>	126	very low	0	53	73
Sauropsida	4 species					
Lepidosauria	<i>Sphenodon punctatus</i>	?	?	0	?	>3
Testudines	<i>Gopherus agassizii</i>	0	0	0	0	0
Archosauria	2 species	0	0	0	0	0
Crocodylia	<i>Alligator</i>	0	0	0	0	0
	<i>mississippiensis</i>					
Aves	<i>Gallus gallus</i>	0	0	0	0	0
Mammalia	44 species	1	high	0	0	1
Prototheria	<i>Ornithorhynchus</i>	0	0	0	0	0
	<i>anatinus</i>					
Metatheria	4 species	1	high to	0	0	1
			very high			
Eutheria	39species	1	high	0	0	1
Afrotheria	2 species	1	high	0	0	1

Xenarthra	<i>Dasybus novemcinctus</i>	1	high	0	0	1
Laurasiatheria	14 species	1	high	0	0	1
Euarchontoglires	22 species	1	high	0	0	1

Mammalian species not listed in the table are the following: Metatheria [Dasyuromorphia (*Sminthopsis macroura*), Didelphimorphia (*Didelphis virginiana*, *Monodelphis domestica*) and Diprotodontia (*Macropus eugenii*)] and Eutheria [superorder Afrotheria (*Loxodonta africana*, *Echinops telfairi*), superorder Laurasiatheria (*Canis familiaris*, *Felis catus*, *Neofelis nebulosa*, *Bos taurus*, *Ovis aries*, *Muntiacus muntjak*, *Sus scrofa*, *Rhinolophus ferrumequinum*, *Carollia perspicillata*, *Artibeus jamaicensis*, *Atelerix albiventris*, *Erinaceus europaeus*, *Sorex araneus*, *Equus caballus*) and superorder Euarchontoglires (*Oryctolagus cuniculus*, *Mus musculus*, *Rattus norvegicus*; *Homo sapiens*, *Pan troglodytes*, *Gorilla gorilla*, *Pongo pygmaeus*, *Nomascus leucogenys*, *Papio anubis*, *Papio hamadryas*, *Cercopithecus aethiops*, *Colobus guereza*, *Macaca mulatta*, *Callithrix jacchus*, *Saimiri boliviensis*, *Aotus nancymae*, *Callicebus moloch*, *Otolemur garnettii*, *Nycticebus coucang*, *Microcebus murinus*, *Eulemur macaco*, *Lemur catta*)]. *: for reptiles only partial genome data are available.

Table S4**Evolutionary distribution pattern of diverse L1 groups in Deuterostomia**

Taxonomic group	L1 group A	L1 group B	L1 group C
Echinodermata	yes	no	no
Urochordata	yes	no	no
Cephalochordata	yes	no	no
Cyclostomata	exp	?	?
Chondrichthyes	exp	yes	?
Actinopterygii	yes	yes	yes
Coelacanthimorpha	?	yes	exp
Dipnoi	?	exp	yes
Amphibia	no	yes	yes
Sauropsida	no	?	yes
Lepidosauria	no	?	yes
Testudines	no	no	no
Archosauria	no	no	no
Crocodilia	no	no	no
Aves	no	no	no
Mammalia	no	no	yes
Prototheria	no	no	no
Metatheria	no	no	yes
Eutheria	no	no	yes

Symbols: exp: presence is expected under SVT hypothesis; ?: no genome data available yet, therefore the presence is currently not known.

Table S5

Phylogenomic analysis of L1 groups in Deuterostomia

L1 group	origin	diversification (duplication)	loss	horizontal transfer
group A	ancestral deuterostome	rich	a) pufferfishes b) Sarcopterygii or Tetrapoda	absent
group B	Basal vertebrates (Cyclostomata or cartilaginous fishes)	rich	c) pufferfish (Tetraodon) d) Amniota or Synapsida	absent
group C	Basal vertebrates (Cyclostomata or cartilaginous fishes)	rich	e) pufferfishes f) Testudines g) Archosauria (crocodiles and birds)	absent

h) Prototheria (platypus)
