

GEPHE SUMMARY

		Gephebase Gene			GepheID
enamelin (ENAM) (https://www.gephebase.org/search-criteria?/and+Gene+Gephebase=enamelin+(ENAM)^#gephebase-summary-title)			GP00001944		Main curator
Published		Entry Status	Courtier		

PHENOTYPIC CHANGE

		Trait Category
Physiology (https://www.gephebase.org/search-criteria?/and+Trait+Category=Physiology^#gephebase-summary-title)		
		Trait
Tooth composition (no enamel production) (https://www.gephebase.org/search-criteria?/and+Trait=Tooth+composition+(no+enamel+production)^#gephebase-summary-title)		
		Trait State in Taxon A
presence of enamel		
		Trait State in Taxon B
absence of enamel		
		Ancestral State
Taxon A		
		Taxonomic Status
Intergeneric or Higher (https://www.gephebase.org/search-criteria?/and+Taxonomic+Status=Intergeneric+or+Higher^#gephebase-summary-title)		

Taxon A		Taxon B #1
	Latin Name	
Canis lupus familiaris (https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=Canis+lupus+familiaris^#gephebase-summary-title)		Manis pentadactyla (https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=Manis+pentadactyla^#gephebase-summary-title)
	Common Name	
dog		Chinese pangolin
	Synonyms	
Canis canis; Canis domesticus; Canis familiaris; dog; dogs; Canis familiaris Linnaeus, 1758; Canis lupus familiaris Linnaeus, 1758		Chinese pangolin; Manis pentadactyla Linnaeus, 1758
	Rank	
subspecies		species
	Lineage	
cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Deuterostomia; Chordata; Craniata; Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Sarcopterygii; Dipnotetrapodomorpha; Tetrapoda; Amniota; Mammalia; Theria; Eutheria; Boreoeutheria; Laurasiatheria; Carnivora; Caniformia; Canidae; Canis; Canis lupus		cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Deuterostomia; Chordata; Craniata; Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Sarcopterygii; Dipnotetrapodomorpha; Tetrapoda; Amniota; Mammalia; Theria; Eutheria; Boreoeutheria; Laurasiatheria; Pholidota; Manidae; Manis
	Parent	
Canis lupus (gray wolf) - (Rank: species) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=9612)		Manis () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=9973)
	NCBI Taxonomy ID	
9615 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=9615)		143292 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=143292)
	is Taxon A an Intraspecies?	
No		No

Taxon B #2		Taxon B #1
	Latin Name	
Manis tricuspis (https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=Manis+tricuspis^#gephebase-summary-title)		Manis pentadactyla (https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=Manis+pentadactyla^#gephebase-summary-title)
	Common Name	
Tree pangolin		Chinese pangolin
	Synonyms	
Phataginus tricuspis; Tree pangolin; Manis tricuspis Rafinesque, 1821		Chinese pangolin; Manis pentadactyla Linnaeus, 1758
	Rank	
species		species
	Lineage	
cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Deuterostomia; Chordata; Craniata; Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Sarcopterygii; Dipnotetrapodomorpha; Tetrapoda; Amniota; Mammalia; Theria; Eutheria; Boreoeutheria; Laurasiatheria; Pholidota; Manidae; Manis		cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Deuterostomia; Chordata; Craniata; Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Sarcopterygii; Dipnotetrapodomorpha; Tetrapoda; Amniota; Mammalia; Theria; Eutheria; Boreoeutheria; Laurasiatheria; Pholidota; Manidae; Manis
	Parent	
Manis () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=9973)		Manis () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=9973)
	NCBI Taxonomy ID	
358128 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=358128)		143292 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=143292)
	is Taxon B an Intraspecies?	
No		No

Taxon B #2		Taxon B #1
	Latin Name	
Manis tricuspis (https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=Manis+tricuspis^#gephebase-summary-title)		Manis pentadactyla (https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=Manis+pentadactyla^#gephebase-summary-title)
	Common Name	
Tree pangolin		Chinese pangolin
	Synonyms	
Phataginus tricuspis; Tree pangolin; Manis tricuspis Rafinesque, 1821		Chinese pangolin; Manis pentadactyla Linnaeus, 1758
	Rank	
species		species
	Lineage	
cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Deuterostomia; Chordata; Craniata; Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Sarcopterygii; Dipnotetrapodomorpha; Tetrapoda; Amniota; Mammalia; Theria; Eutheria; Boreoeutheria; Laurasiatheria; Pholidota; Manidae; Manis		cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Deuterostomia; Chordata; Craniata; Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Sarcopterygii; Dipnotetrapodomorpha; Tetrapoda; Amniota; Mammalia; Theria; Eutheria; Boreoeutheria; Laurasiatheria; Pholidota; Manidae; Manis
	Parent	
Manis () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=9973)		Manis () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=9973)
	NCBI Taxonomy ID	
358128 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=358128)		143292 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=143292)
	is Taxon B an Intraspecies?	
No		No

GENOTYPIC CHANGE

ENAM	Generic Gene Name	Q9NRM1 (http://www.uniprot.org/uniprot/Q9NRM1)	UniProtKB Homo sapiens
ADA1; AI1C; AIH2	Synonyms	0	GenebankID or UniProtKB
9606.ENSP00000379383 (http://string-db.org/newstring.cgi/show_network_section.pl?identifier=9606.ENSP00000379383)	String		
-	Sequence Similarities		
GO:0030345 : structural constituent of tooth enamel (https://www.ebi.ac.uk/QuickGO/term/GO:0030345)	GO - Molecular Function		
GO:0044267 : cellular protein metabolic process (https://www.ebi.ac.uk/QuickGO/term/GO:0044267)	GO - Biological Process		
GO:0043687 : post-translational protein modification (https://www.ebi.ac.uk/QuickGO/term/GO:0043687)			
GO:0031214 : biomineral tissue development (https://www.ebi.ac.uk/QuickGO/term/GO:0031214)			
GO:0036305 : ameloblast differentiation (https://www.ebi.ac.uk/QuickGO/term/GO:0036305)			
GO:0097186 : amelogenesis (https://www.ebi.ac.uk/QuickGO/term/GO:0097186)			
GO:0070175 : positive regulation of enamel mineralization (https://www.ebi.ac.uk/QuickGO/term/GO:0070175)			
GO:0022604 : regulation of cell morphogenesis (https://www.ebi.ac.uk/QuickGO/term/GO:0022604)			
GO:0031012 : extracellular matrix (https://www.ebi.ac.uk/QuickGO/term/GO:0031012)	GO - Cellular Component		
GO:0005788 : endoplasmic reticulum lumen (https://www.ebi.ac.uk/QuickGO/term/GO:0005788)			
Yes (https://www.gephebase.org/search-criteria?/and+Presumptive Null=^Yes^#gephebase-summary-title)			Presumptive Null
Coding (https://www.gephebase.org/search-criteria?/and+Molecular Type=^Coding^#gephebase-summary-title)			Molecular Type
Unknown (https://www.gephebase.org/search-criteria?/and+Aberration Type=^Unknown^#gephebase-summary-title)			Aberration Type
multiple deletions and insertions less than 9bp causing frameshift			Molecular Details of the Mutation
Candidate Gene (https://www.gephebase.org/search-criteria?/and+Experimental Evidence=^Candidate Gene^#gephebase-summary-title)			Experimental Evidence
Molecular decay of the tooth gene Enamelin (ENAM) mirrors the loss of enamel in the fossil record of placental mammals. (2009) (https://pubmed.ncbi.nlm.nih.gov/19730686)			Main Reference
Meredith RW; Gatesy J; Murphy WJ; Ryder OA; Springer MS			Authors
Vestigial structures occur at both the anatomical and molecular levels, but studies documenting the co-occurrence of morphological degeneration in the fossil record and molecular decay in the genome are rare. Here, we use morphology, the fossil record, and phylogenetics to predict the occurrence of "molecular fossils" of the enamel (ENAM) gene in four different orders of placental mammals (Tubulidentata, Pholidota, Cetacea, Xenarthra) with toothless and/or enamelless taxa. Our results support the "molecular fossil" hypothesis and demonstrate the occurrence of frameshift mutations and/or stop codons in all toothless and enamelless taxa. We then use a novel method based on selection intensity estimates for codons (omega) to calculate the timing of iterated enamel loss in the fossil record of aardvarks and pangolins, and further show that the molecular evolutionary history of ENAM predicts the occurrence of enamel in basal representatives of Xenarthra (sloths, anteaters, armadillos) even though frameshift mutations are ubiquitous in ENAM sequences of living xenarthrans. The molecular decay of ENAM parallels the morphological degeneration of enamel in the fossil record of placental mammals and provides manifest evidence for the predictive power of Darwin's theory.			Abstract
			Additional References

RELATED GEPHE

No matches found.	Related Genes
1 (https://www.gephebase.org/search-criteria?/or+Gene Gephebase=^enamelin (ENAM)^/and+Taxon ID=^9615^/or+Gene Gephebase=^enamelin (ENAM)^/and+Taxon ID=^143292^/or+Gene Gephebase=^enamelin (ENAM)^/and+Taxon ID=^358128^#gephebase-summary-title)	Related Haplotypes

EXTERNAL LINKS

COMMENTS

@ParrallelEvolution in baleen whales.