

GEPHE SUMMARY

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

PHENOTYPIC CHANGE

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

Taxon A	Latin Name
Canis lupus familiaris (<a href="https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=<sup>^</sup>Canis lupus familiaris<sup>^</sup>#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=[^]Canis lupus familiaris[^]#gephebase-summary-title)	
dog	Common Name
Canis canis; Canis domesticus; Canis familiaris; dog; dogs; Canis familiaris Linnaeus, 1758; Canis lupus familiaris Linnaeus, 1758	Synonyms
subspecies	Rank
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	Lineage
Canis lupus (gray wolf) - (Rank: species) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=9612)	Parent
9615 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=9615)	NCBI Taxonomy ID
No	is Taxon A an Intraspecies?

Taxon B #1	Latin Name
Manis pentadactyla (<a href="https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=<sup>^</sup>Manis pentadactyla<sup>^</sup>#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=[^]Manis pentadactyla[^]#gephebase-summary-title)	
Chinese pangolin	Common Name
Chinese pangolin; Manis pentadactyla Linnaeus, 1758	Synonyms
species	Rank
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	Lineage
Manis () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=9973)	Parent
143292 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=143292)	NCBI Taxonomy ID
No	is Taxon B an Intraspecies?

Taxon B #2	Latin Name
Manis tricuspis (<a href="https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=<sup>^</sup>Manis tricuspis<sup>^</sup>#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=[^]Manis tricuspis[^]#gephebase-summary-title)	
Tree pangolin	Common Name
Phataginus tricuspis; Tree pangolin; Manis tricuspis Rafinesque, 1821	Synonyms
species	Rank
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	Lineage
Manis () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=9973)	Parent
358128 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=358128)	NCBI Taxonomy ID

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.ENSPO0000379383 (http://string-db.org/newstring.cgi/show_network_section.pl?identifier=9606.ENSPO0000379383)	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 enamelin (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.