

GEPHE SUMMARY

lysozyme (https://www.gephebase.org/search-criteria?/and+Gene Gephebase= [^] lysozyme [^] #gephebase-summary-title)	Gephebase Gene	GP00000558	GepheID
Published	Entry Status	Martin	Main curator

PHENOTYPIC CHANGE

Physiology (https://www.gephebase.org/search-criteria?/and+Trait Category= [^] Physiology [^] #gephebase-summary-title)	Trait Category		
Digestion (anaerobic enzymatic activity) (https://www.gephebase.org/search-criteria?/and+Trait = [^] Digestion (anaerobic enzymatic activity) [^] #gephebase-summary-title)	Trait		
Other primates	Trait State in Taxon A		
Colobines	Trait State in Taxon B		
Data not curated	Ancestral State		
Intergeneric or Higher (https://www.gephebase.org/search-criteria?/and+Taxonomic Status= [^] Intergeneric or Higher [^] #gephebase-summary-title)	Taxonomic Status		
	Taxon A	Taxon B	
Primates (https://www.gephebase.org/search-criteria?/and+Taxon Synonyms= [^] Primates [^] #gephebase-summary-title)	Latin Name	Colobinae (https://www.gephebase.org/search-criteria?/and+Taxon Synonyms= [^] Colobinae [^] #gephebase-summary-title)	Latin Name
-	Common Name	-	Common Name
Primata; Primates Linnaeus, 1758	Synonyms	-	Synonyms
order	Rank	subfamily	Rank
cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Deuterostomia; Chordata; Craniata; Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Sarcopterygii; Dipnotetrapodomorpha; Tetrapoda; Amniota; Mammalia; Theria; Eutheria; Boreoeutheria; Euarchontoglires	Lineage	cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Deuterostomia; Chordata; Craniata; Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Sarcopterygii; Dipnotetrapodomorpha; Tetrapoda; Amniota; Mammalia; Theria; Eutheria; Boreoeutheria; Euarchontoglires; Primates; Haplorrhini; Simiiformes; Catarrhini; Cercopithecoidea; Cercopithecidae	Lineage
Euarchontoglires () - (Rank: superorder) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=314146)	Parent	Cercopithecidae (Old World monkeys) - (Rank: family) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=9527)	Parent
9443 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=9443)	NCBI Taxonomy ID	9569 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=9569)	NCBI Taxonomy ID
No	is Taxon A an Intraspecies?	No	is Taxon B an Intraspecies?

GENOTYPIC CHANGE

LYZ1	Generic Gene Name	P04421 (http://www.uniprot.org/uniprot/P04421)	UniProtKB Bos taurus
-	Synonyms	()	GenebankID or UniProtKB
-	String		
Belongs to the glycosyl hydrolase 22 family.	Sequence Similarities		
GO:0003796 : lysozyme activity (https://www.ebi.ac.uk/QuickGO/term/GO:0003796)	GO - Molecular Function		
GO:0050829 : defense response to Gram-negative bacterium (https://www.ebi.ac.uk/QuickGO/term/GO:0050829)	GO - Biological Process		
GO:0050830 : defense response to Gram-positive bacterium (https://www.ebi.ac.uk/QuickGO/term/GO:0050830)			
GO:0019835 : cytolysis (https://www.ebi.ac.uk/QuickGO/term/GO:0019835)			
GO:0007586 : digestion (https://www.ebi.ac.uk/QuickGO/term/GO:0007586)			

Mutation #1

No (<https://www.gephebase.org/search-criteria?/and+Presumptive Null=`No`#gephebase-summary-title>) Presumptive Null

Coding (<https://www.gephebase.org/search-criteria?/and+Molecular Type=`Coding`#gephebase-summary-title>) Molecular Type

SNP (<https://www.gephebase.org/search-criteria?/and+Aberration Type=`SNP`#gephebase-summary-title>) Aberration Type

Nonsynonymous SNP Coding Change

R14K Molecular Details of the Mutation

Candidate Gene (<https://www.gephebase.org/search-criteria?/and+Experimental Evidence=`Candidate Gene`#gephebase-summary-title>) Experimental Evidence

	Taxon A	Taxon B	Position
Codon	-	-	-
Amino-acid	Arg	Lys	14

Adaptive evolution in the stomach lysozymes of foregut fermenters. (1987 Nov 26-Dec 2) (<https://pubmed.ncbi.nlm.nih.gov/3120013>) Main Reference

Stewart CB; Schilling JW; Wilson AC Authors

The convergent evolution of a fermentative foregut in two groups of mammals offers an opportunity to study adaptive evolution at the protein level. The appearance of this mode of digestion has been accompanied by the recruitment of lysozyme as a bacteriolytic enzyme in the stomach both in the ruminants (for example the cow) and later in the colobine monkeys (for example the langur). The stomach lysozymes of these two groups share some physicochemical and catalytic properties that appear to adapt them for functioning in the stomach fluid. To examine the basis for these shared properties, we sequenced langur stomach lysozyme and compared it to other lysozymes of known sequence. Tree analysis suggest that, after foregut fermentation arose in monkeys, the langur lysozyme gained sequence similarity to cow stomach lysozyme and evolved two times faster than the other primate lysozymes. This rapid evolution, coupled with functional and sequence convergence upon cow stomach lysozyme, could imply that positive darwinian selection has driven about 50% of the evolution of langur stomach lysozyme. Abstract

Molecular adaptation of a leaf-eating bird: stomach lysozyme of the hoatzin. (1994) (<https://pubmed.ncbi.nlm.nih.gov/7815930>) Additional References

Stomach lysozyme gene of the langur monkey: tests for convergence and positive selection. (1991) (<https://pubmed.ncbi.nlm.nih.gov/1960739>)

Episodic adaptive evolution of primate lysozymes. (1997) (<https://pubmed.ncbi.nlm.nih.gov/8990116>)

Mutation #2

No (<https://www.gephebase.org/search-criteria?/and+Presumptive Null=`No`#gephebase-summary-title>) Presumptive Null

Coding (<https://www.gephebase.org/search-criteria?/and+Molecular Type=`Coding`#gephebase-summary-title>) Molecular Type

SNP (<https://www.gephebase.org/search-criteria?/and+Aberration Type=`SNP`#gephebase-summary-title>) Aberration Type

Nonsynonymous SNP Coding Change

R21K Molecular Details of the Mutation

Candidate Gene (<https://www.gephebase.org/search-criteria?/and+Experimental Evidence=`Candidate Gene`#gephebase-summary-title>) Experimental Evidence

	Taxon A	Taxon B	Position
Codon	-	-	-
Amino-acid	Arg	Lys	21

Adaptive evolution in the stomach lysozymes of foregut fermenters. (1987 Nov 26-Dec 2) (<https://pubmed.ncbi.nlm.nih.gov/3120013>) Main Reference

Stewart CB; Schilling JW; Wilson AC Authors

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Mutation #3

No ([https://www.gephebase.org/search-criteria?/and+Presumptive Null="+No^#gephebase-summary-title](https://www.gephebase.org/search-criteria?/and+Presumptive+Null=))

Presumptive Null

Coding ([https://www.gephebase.org/search-criteria?/and+Molecular Type="+Coding^#gephebase-summary-title](https://www.gephebase.org/search-criteria?/and+Molecular+Type=))

Molecular Type

SNP ([https://www.gephebase.org/search-criteria?/and+Aberration Type="+SNP^#gephebase-summary-title](https://www.gephebase.org/search-criteria?/and+Aberration+Type=))

Aberration Type

Nonsynonymous

SNP Coding Change

N75D

Molecular Details of the Mutation

Candidate Gene ([https://www.gephebase.org/search-criteria?/and+Experimental Evidence="+Candidate Gene^#gephebase-summary-title](https://www.gephebase.org/search-criteria?/and+Experimental+Evidence=))

Experimental Evidence

	Taxon A	Taxon B	Position
Codon	-	-	-
Amino-acid	Asn	Asp	75

Main Reference

Adaptive evolution in the stomach lysozymes of foregut fermenters. (1987 Nov 26-Dec 2) (<https://pubmed.ncbi.nlm.nih.gov/3120013>)

Authors

Stewart CB; Schilling JW; Wilson AC

Abstract

The convergent evolution of a fermentative foregut in two groups of mammals offers an opportunity to study adaptive evolution at the protein level. The appearance of this mode of digestion has been accompanied by the recruitment of lysozyme as a bacteriolytic enzyme in the stomach both in the ruminants (for example the cow) and later in the colobine monkeys (for example the langur). The stomach lysozymes of these two groups share some physicochemical and catalytic properties that appear to adapt them for functioning in the stomach fluid. To examine the basis for these shared properties, we sequenced langur stomach lysozyme and compared it to other lysozymes of known sequence. Tree analysis suggest that, after foregut fermentation arose in monkeys, the langur lysozyme gained sequence similarity to cow stomach lysozyme and evolved two times faster than the other primate lysozymes. This rapid evolution, coupled with functional and sequence convergence upon cow stomach lysozyme, could imply that positive darwinian selection has driven about 50% of the evolution of langur stomach lysozyme.

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Mutation #4

No ([https://www.gephebase.org/search-criteria?/and+Presumptive Null="+No^#gephebase-summary-title](https://www.gephebase.org/search-criteria?/and+Presumptive+Null=))

Presumptive Null

Coding ([https://www.gephebase.org/search-criteria?/and+Molecular Type="+Coding^#gephebase-summary-title](https://www.gephebase.org/search-criteria?/and+Molecular+Type=))

Molecular Type

SNP ([https://www.gephebase.org/search-criteria?/and+Aberration Type="+SNP^#gephebase-summary-title](https://www.gephebase.org/search-criteria?/and+Aberration+Type=))

Aberration Type

Nonsynonymous

SNP Coding Change

D87N

Molecular Details of the Mutation

Candidate Gene ([https://www.gephebase.org/search-criteria?/and+Experimental Evidence="+Candidate Gene^#gephebase-summary-title](https://www.gephebase.org/search-criteria?/and+Experimental+Evidence=))

Experimental Evidence

	Taxon A	Taxon B	Position
Codon	-	-	-
Amino-acid	Asp	Asn	87

Main Reference

Adaptive evolution in the stomach lysozymes of foregut fermenters. (1987 Nov 26-Dec 2) (<https://pubmed.ncbi.nlm.nih.gov/3120013>)

Authors

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 Episodic adaptive evolution of primate lysozymes. (1997) (<https://pubmed.ncbi.nlm.nih.gov/8990116>)

Mutation #5

No (<https://www.gephebase.org/search-criteria?/and+Presumptive Null=~No^#gephebase-summary-title>) Presumptive Null
 Coding (<https://www.gephebase.org/search-criteria?/and+Molecular Type=~Coding^#gephebase-summary-title>) Molecular Type
 SNP (<https://www.gephebase.org/search-criteria?/and+Aberration Type=~SNP^#gephebase-summary-title>) Aberration Type
 Nonsynonymous SNP Coding Change
 X126K (sequence in the closest ancestor with ancestral trait unknown) Molecular Details of the Mutation
 Candidate Gene (<https://www.gephebase.org/search-criteria?/and+Experimental Evidence=~Candidate Gene^#gephebase-summary-title>) Experimental Evidence

	Taxon A	Taxon B	Position
Codon	-	-	-
Amino-acid	-	Lys	126

Adaptive evolution in the stomach lysozymes of foregut fermenters. (1987 Nov 26-Dec 2) (<https://pubmed.ncbi.nlm.nih.gov/3120013>) Main Reference
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 Episodic adaptive evolution of primate lysozymes. (1997) (<https://pubmed.ncbi.nlm.nih.gov/8990116>)

RELATED GEPHE

3 (ATP4B, cathepsin E, RNASE1B) (<https://www.gephebase.org/search-criteria?/or+Taxon ID=~9443^/and+Trait=Digestion/or+Taxon ID=~9569^/and+Trait=Digestion/and+groupHaplotypes=true#gephebase-summary-title>) Related Genes
 No matches found. Related Haplotypes

EXTERNAL LINKS

COMMENTS

@SeveralMutationsWithEffect

