

GEPHE SUMMARY

Gephebase Gene		GepheID
ribonuclease 1B (RNase1B) (<a +ribonuclease+1b+(rnase1b)+"#gepibase-summary-title"="" href="https://www.gepibase.org/search-criteria?/and+Gene+Gepibase=">https://www.gepibase.org/search-criteria?/and+Gene+Gepibase="+ribonuclease+1B+(RNase1B)+"#gepibase-summary-title)	GP00000988	Main curator
Entry Status	Courtier	
Published		

PHENOTYPIC CHANGE

[illegible]

GENOTYPIC CHANGE

Gene Name	UniProtKB Pygathrix nemaeus
RNASE1B	Q8SPN3 (http://www.uniprot.org/uniprot/Q8SPN3)
Synonyms	GenebankID or UniProtKB
-	0
String	
-	
Sequence Similarities	
Belongs to the pancreatic ribonuclease family.	
GO - Molecular Function	
GO:0003676 : nucleic acid binding (https://www.ebi.ac.uk/QuickGO/term/GO:0003676)	
GO:0004522 : ribonuclease A activity (https://www.ebi.ac.uk/QuickGO/term/GO:0004522)	
GO - Biological Process	
-	
GO - Cellular Component	
GO:0005576 : extracellular region (https://www.ebi.ac.uk/QuickGO/term/GO:0005576)	

Mutation #1

Presumptive Null

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

Molecular Type

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

Aberration Type

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

SNP Coding Change

Nonsynonymous

Molecular Details of the Mutation

The three amino acid changes R4Q K6E R39W have a phenotypic effect in combination - the effect of a single amino acid change has not been tested - the fact that they evolved independently in another lineage suggests that they all have a phenotypic effect

Experimental Evidence

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=))

	Taxon A	Taxon B	Position
Codon	-	-	-
Amino-acid	Arg	Gln	4

Main Reference

Parallel adaptive origins of digestive RNases in Asian and African leaf monkeys. (2006) (<https://pubmed.ncbi.nlm.nih.gov/16767103>)

Authors

Zhang J

Abstract

Similar morphological or physiological changes occurring in multiple evolutionary lineages are not uncommon. Such parallel changes are believed to be adaptive, because a complex character is unlikely to originate more than once by chance. However, the occurrence of adaptive parallel amino acid substitutions is debated. Here I propose four requirements for establishing adaptive parallel evolution at the protein sequence level and use these criteria to demonstrate such a case. I report that the gene encoding pancreatic ribonuclease was duplicated independently in Asian and African leaf-eating monkeys. Statistical analyses of DNA sequences, functional assays of reconstructed ancestral proteins and site-directed mutagenesis show that the new genes acquired enhanced digestive efficiencies through parallel amino acid replacements driven by darwinian selection. They also lost a non-digestive function independently, under a relaxed selective constraint. These results demonstrate that despite the overall stochasticity, even molecular evolution has a certain degree of repeatability and predictability under the pressures of natural selection.

Additional References

Mutation #2

Presumptive Null

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

Molecular Type

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

Aberration Type

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

SNP Coding Change

Nonsynonymous

Molecular Details of the Mutation

The three amino acid changes R4Q K6E R39W have a phenotypic effect in combination - the effect of a single amino acid change has not been tested - the fact that they evolved independently in another lineage suggests that they all have a phenotypic effect

Experimental Evidence

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=))

	Taxon A	Taxon B	Position
Codon	-	-	-
Amino-acid	Lys	Glu	6

Main Reference

Parallel adaptive origins of digestive RNases in Asian and African leaf monkeys. (2006) (<https://pubmed.ncbi.nlm.nih.gov/16767103>)

Authors

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Abstract

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Additional References

Mutation #3

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

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

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

Nonsynonymous

The three amino acid changes R4Q K6E R39W have a phenotypic effect in combination - the effect of a single amino acid change has not been tested - the fact that they evolved independently in another lineage suggests that they all have a phenotypic effect

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

Presumptive Null

Molecular Type

Aberration Type

SNP Coding Change

Molecular Details of the Mutation

Experimental Evidence

	Taxon A	Taxon B	Position
Codon	-	-	-
Amino-acid	Arg	Trp	39

Parallel adaptive origins of digestive RNases in Asian and African leaf monkeys. (2006) (<https://pubmed.ncbi.nlm.nih.gov/16767103>)

Zhang J

Similar morphological or physiological changes occurring in multiple evolutionary lineages are not uncommon. Such parallel changes are believed to be adaptive, because a complex character is unlikely to originate more than once by chance. However, the occurrence of adaptive parallel amino acid substitutions is debated. Here I propose four requirements for establishing adaptive parallel evolution at the protein sequence level and use these criteria to demonstrate such a case. I report that the gene encoding pancreatic ribonuclease was duplicated independently in Asian and African leaf-eating monkeys. Statistical analyses of DNA sequences, functional assays of reconstructed ancestral proteins and site-directed mutagenesis show that the new genes acquired enhanced digestive efficiencies through parallel amino acid replacements driven by darwinian selection. They also lost a non-digestive function independently, under a relaxed selective constraint. These results demonstrate that despite the overall stochasticity, even molecular evolution has a certain degree of repeatability and predictability under the pressures of natural selection.

Main Reference

Authors

Abstract

Additional References

RELATED GEPHE

No matches found.

1 ([https://www.gephebase.org/search-criteria?/or+Gene Gephebase=^ribonuclease 1B \(RNase1B\)^/and+Taxon ID=^9443^/or+Gene Gephebase=^ribonuclease 1B \(RNase1B\)^/and+Taxon ID=^33548^#gephebase-summary-title](https://www.gephebase.org/search-criteria?/or+Gene Gephebase=^ribonuclease 1B (RNase1B)^/and+Taxon ID=^9443^/or+Gene Gephebase=^ribonuclease 1B (RNase1B)^/and+Taxon ID=^33548^#gephebase-summary-title))

Related Genes

Related Haplotypes

EXTERNAL LINKS

COMMENTS