

## GEPHE SUMMARY

	Gephebase Gene	GephelD
PTPN1 ( <a href="https://www.gephebase.org/search-criteria?/and+Gene">https://www.gephebase.org/search-criteria?/and+Gene</a> Gephebase=^PTPN1^#gephebase-summary-title)	GP00002668	Main curator
Published	Entry Status	Courtier

## PHENOTYPIC CHANGE

	Trait Category		
Physiology ( <a href="https://www.gephebase.org/search-criteria?/and+Trait">https://www.gephebase.org/search-criteria?/and+Trait</a> Category=^Physiology^#gephebase-summary-title)	Trait		
High-altitude adaptation ( <a href="https://www.gephebase.org/search-criteria?/and+Trait=^High-altitude+adaptation^#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Trait=^High-altitude+adaptation^#gephebase-summary-title</a> )	Trait State in Taxon A		
Locusta migratoria	Trait State in Taxon B		
Locusta migratoria - Tibetan adapted to high altitude	Ancestral State		
Taxon A	Taxonomic Status		
Intraspecific ( <a href="https://www.gephebase.org/search-criteria?/and+Taxonomic">https://www.gephebase.org/search-criteria?/and+Taxonomic</a> Status=^Intraspecific^#gephebase-summary-title)			
Taxon A	Latin Name	Taxon B	Latin Name
Locusta migratoria ( <a href="https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=^Locusta+migratoria^#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=^Locusta+migratoria^#gephebase-summary-title</a> )	Locusta migratoria ( <a href="https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=^Locusta+migratoria^#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=^Locusta+migratoria^#gephebase-summary-title</a> )		
migratory locust	Common Name		Common Name
migratory locust; Locusta migratoria (Linnaeus, 1758)	Synonyms		Synonyms
species	Rank		Rank
cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Protostomia; Ecdysozoa; Panarthropoda; Arthropoda; Mandibulata; Pancrustacea; Hexapoda; Insecta; Dicondylia; Pterygota; Neoptera; Polynoeoptera; Orthoptera; Caelifera; Acrididea; Acridomorpha; Acridoidea; Acrididae; Oedipodinae; Locusta	Lineage		Lineage
Locusta () - (Rank: genus) ( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 7003">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 7003</a> )	Parent	Locusta () - (Rank: genus) ( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 7003">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 7003</a> )	Parent
7004 ( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 7004">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 7004</a> )	NCBI Taxonomy ID	7004 ( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 7004">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 7004</a> )	NCBI Taxonomy ID
No	is Taxon A an Infraspecies?		is Taxon B an Infraspecies?
	No		

## GENOTYPIC CHANGE

-	Generic Gene Name	UniProtKB
-	P18031NULL ( <a href="http://www.uniprot.org/uniprot/P18031NULL">http://www.uniprot.org/uniprot/P18031NULL</a> )	GenebankID or UniProtKB
-	0	
-	String	
-	Sequence Similarities	
-	GO - Molecular Function	
-	GO - Biological Process	
-	GO - Cellular Component	
-		Presumptive Null
No ( <a href="https://www.gephebase.org/search-criteria?/and+Presumptive+Null=^No^#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Presumptive+Null=^No^#gephebase-summary-title</a> )		Molecular Type
Coding ( <a href="https://www.gephebase.org/search-criteria?/and+Molecular+Type=^Coding^#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Molecular+Type=^Coding^#gephebase-summary-title</a> )		

SNP (<https://www.gephebase.org/search-criteria/?and+Aberration+Type=%5E+SNP%5E+gephebase-summary-title>)

SNP Coding Change

Nonsynonymous

Molecular Details of the Mutation

one nonsynonymous mutation (c.1046A&gt;T) in PTPN1 in Tibetan locusts which encodes the amino acid substitution p.Asn349Ile at the proline (Pro)-rich domain of PTP1B.

Experimental Evidence

Association Mapping (<https://www.gephebase.org/search-criteria/?and+Experimental+Evidence=%5E+Association+Mapping%5E+gephebase-summary-title>)

	Taxon A	Taxon B	Position
Codon	AAY	ATY	1046
Amino-acid	Asn	Ile	349

Main Reference

Genetic variation in PTPN1 contributes to metabolic adaptation to high-altitude hypoxia in Tibetan migratory locusts. (2018) (<https://pubmed.ncbi.nlm.nih.gov/30478313>)

Authors

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Abstract

Animal and human highlanders have evolved distinct traits to enhance tissue oxygen delivery and utilization. Unlike vertebrates, insects use their tracheal system for efficient oxygen delivery. However, the genetic basis of insect adaptation to high-altitude hypoxia remains unexplored. Here, we report a potential mechanism of metabolic adaptation of migratory locusts in the Tibetan Plateau, through whole-genome resequencing and functional investigation. A genome-wide scan revealed that the positively selected genes in Tibetan locusts are predominantly involved in carbon and energy metabolism. We observed a notable signal of natural selection in the gene PTPN1, which encodes PTP1B, an inhibitor of insulin signaling pathway. We show that a PTPN1 coding mutation regulates the metabolism of Tibetan locusts by mediating insulin signaling activity in response to hypoxia. Overall, our findings provide evidence for the high-altitude hypoxia adaptation of insects at the genomic level and explore a potential regulatory mechanism underlying the evolved metabolic homeostasis.

Additional References

## RELATED GEPHE

Related Genes

No matches found.

Related Haplotypes

No matches found.

## EXTERNAL LINKS

## COMMENTS

@SelectiveSweep UniProtID=P18031