

GEPHE SUMMARY

GST (https://www.gephebase.org/search-criteria?/and+Gene+Gephebase=^GST^#gephebase-summary-title)	Gephebase Gene	GP00002643	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		
Xenobiotic resistance (pyrethroid) (https://www.gephebase.org/search-criteria?/and+Trait=^Xenobiotic+resistance+(pyrethroid)^#gephebase-summary-title)	Trait		
Nilaparvata lugens - sensitive	Trait State in Taxon A		
Nilaparvata lugens - resistant	Trait State in Taxon B		
Taxon A	Ancestral State		
Intraspecific (https://www.gephebase.org/search-criteria?/and+Taxonomic+Status=^Intraspecific^#gephebase-summary-title)	Taxonomic Status		
	Taxon A	Taxon B	
Nilaparvata lugens (https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=^Nilaparvata+lugens^#gephebase-summary-title)	Latin Name	Nilaparvata lugens (https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=^Nilaparvata+lugens^#gephebase-summary-title)	Latin Name
brown planthopper	Common Name	brown planthopper	Common Name
brown planthopper; Nilaparvata lugens (Stal, 1854); Nalaparvata lugens species	Synonyms	brown planthopper; Nilaparvata lugens (Stal, 1854); Nalaparvata lugens species	Synonyms
cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Protostomia; Ecdysozoa; Panarthropoda; Arthropoda; Mandibulata; Pancrustacea; Hexapoda; Insecta; Dicondylia; Pterygota; Neoptera; Paraneoptera; Hemiptera; Auchenorrhyncha; Fulgoromorpha; Fulgoroidea; Delphacidae; Delphacinae; Nilaparvata	Lineage	cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Protostomia; Ecdysozoa; Panarthropoda; Arthropoda; Mandibulata; Pancrustacea; Hexapoda; Insecta; Dicondylia; Pterygota; Neoptera; Paraneoptera; Hemiptera; Auchenorrhyncha; Fulgoromorpha; Fulgoroidea; Delphacidae; Delphacinae; Nilaparvata	Lineage
Nilaparvata () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=108930)	Parent	Nilaparvata () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=108930)	Parent
108931 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=108931)	NCBI Taxonomy ID	108931 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=108931)	NCBI Taxonomy ID
No	is Taxon A an Intraspecies?	No	is Taxon B an Intraspecies?

GENOTYPIC CHANGE

GstD1	Generic Gene Name	P20432 (http://www.uniprot.org/uniprot/P20432)	UniProtKB Drosophila melanogaster
CG10045; D1; dGstD1; Dmel\CG10045; DmGst-1; DmGst1; DmGST1; dmGSTD1; DmGSTD1; DmGSTD1-1; G-S-T; gst; Gst; GST; GST-1; gst-D; Gst-D1; GST-D1; gst-D1-1; Gst1; GST1; GSt1-1; GST1-1; GSt1.1; GSTase; gstD; GstD; gstd1; gstD1; GSTD1; T5; GSTD1-1	Synonyms	()	GenebankID or UniProtKB
7227.FBpp0099824 (http://string-db.org/newstring.cgi/show_network_section.pl?identifier=7227.FBpp0099824)	String		
Belongs to the GST superfamily. Delta family.	Sequence Similarities		
GO:0004364 : glutathione transferase activity (https://www.ebi.ac.uk/QuickGO/term/GO:0004364)	GO - Molecular Function		
GO:0004602 : glutathione peroxidase activity (https://www.ebi.ac.uk/QuickGO/term/GO:0004602)			

GO:0018833 : DDT-dehydrochlorinase activity
(<https://www.ebi.ac.uk/QuickGO/term/GO:0018833>)

GO - Biological Process

GO:0006749 : glutathione metabolic process
(<https://www.ebi.ac.uk/QuickGO/term/GO:0006749>)

GO - Cellular Component

GO:0005737 : cytoplasm (<https://www.ebi.ac.uk/QuickGO/term/GO:0005737>)

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

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

Aberration Type

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

Insertion Size

unknown

Molecular Details of the Mutation

nlgst1-1 is overexpressed in resistant insects. Southern analysis of genomic DNA from the resistant and susceptible strains indicated that GST-based insecticide resistance may be associated with gene amplification in *N. lugens*.

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=))

Main Reference

Purification, molecular cloning and heterologous expression of a glutathione *S*-transferase involved in insecticide resistance from the rice brown planthopper, *Nilaparvata lugens*. (2002)
(<https://pubmed.ncbi.nlm.nih.gov/11853540>)

Authors

Vontas JG; Small GJ; Nikou DC; Ranson H; Hemingway J

Abstract

A novel glutathione *S*-transferase (GST)-based pyrethroid resistance mechanism was recently identified in *Nilaparvata lugens* [Vontas, Small and Hemingway (2001) *Biochem. J.* 357, 65-72]. To determine the nature of GSTs involved in conferring this resistance, the GSTs from resistant and susceptible strains of *N. lugens* were partially purified by anion exchange and affinity chromatography. The majority of peroxidase activity, previously correlated with resistance, was confined to the fraction that bound to the affinity column, which was considerably elevated in the resistant insects. A cDNA clone encoding a GST (nlgst1-1) - the first reported GST sequence from Hemiptera with up to 54% deduced amino-acid identity with other insect class I GSTs - was isolated from a pyrethroid-resistant strain. Northern analysis showed that nlgst1-1 was overexpressed in resistant insects. nlgst1-1 was expressed in *Escherichia coli*, purified and characterized. The ability of the recombinant protein to bind to the *S*-hexylglutathione affinity matrix, its substrate specificities and its immunological properties confirmed that this GST was one from the elevated subset of *N. lugens* GSTs. Peroxidase activity of the recombinant nlgst1-1 indicated that it had a role in resistance, through detoxification of lipid peroxidation products induced by pyrethroids. Southern analysis of genomic DNA from the resistant and susceptible strains indicated that GST-based insecticide resistance may be associated with gene amplification in *N. lugens*.

Additional References

RELATED GEPHE

Related Genes

4 (Acetylcholinesterase (Ace-1), CYP6AY1, CYP6ER1, esterase NI-EST1) ([https://www.gephebase.org/search-criteria?/or+Taxon ID="+108931^/and+Trait=Xenobiotic resistance/and+groupHaplotypes=true#gephebase-summary-title](https://www.gephebase.org/search-criteria?/or+Taxon+ID=))

Related Haplotypes

No matches found.

EXTERNAL LINKS

COMMENTS