

GEPHE SUMMARY

	Gephebase Gene	GephelD
GST (https://www.gephebase.org/search-criteria/?and+Gene Gephebase=^GST^#gephebase-summary-title)	GP00002643	Main curator
Published	Entry Status	Courtier

PHENOTYPIC CHANGE

		Trait Category	
Physiology (https://www.gephebase.org/search-criteria/?and+Trait Category=^Physiology^#gephebase-summary-title)		Trait	
Xenobiotic resistance (pyrethroid) (https://www.gephebase.org/search-criteria/?and+Trait=^Xenobiotic+resistance+(pyrethroid)^#gephebase-summary-title)		Trait State in Taxon A	
Nilaparvata lugens - sensitive		Trait State in Taxon B	
Nilaparvata lugens - resistant		Ancestral State	
Taxon A		Taxonomic Status	
Intraspecific (https://www.gephebase.org/search-criteria/?and+Taxonomic Status=^Intraspecific^#gephebase-summary-title)			
Taxon A		Taxon B	
Nilaparvata lugens	Latin Name	Nilaparvata lugens	Latin Name
(https://www.gephebase.org/search-criteria/?and+Taxon+and+Synonyms=^Nilaparvata+lugens^#gephebase-summary-title)		(https://www.gephebase.org/search-criteria/?and+Taxon+and+Synonyms=^Nilaparvata+lugens^#gephebase-summary-title)	
brown planthopper	Common Name	brown planthopper	Common Name
brown planthopper; Nilaparvata lugens (Stal, 1854); Nalaparvata lugens	Synonyms	brown planthopper; Nilaparvata lugens (Stal, 1854); Nalaparvata lugens	Synonyms
species	Rank	species	Rank
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)	Parent	Nilaparvata () - (Rank: genus)	Parent
(https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=108930)		(https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=108930)	
108931	NCBI Taxonomy ID	108931	NCBI Taxonomy ID
(https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=108931)		(https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=108931)	
No	is Taxon A an Infraspecies?	No	is Taxon B an Infraspecies?

GENOTYPIC CHANGE

GstD1	Generic Gene Name	UniProtKB Drosophila melanogaster
	Synonyms	GenebankID or UniProtKB
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		0
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>)

Molecular Type

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

Aberration Type

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

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>)

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>)

Related Haplotypes

No matches found.

EXTERNAL LINKS

COMMENTS