GEPHE SUMMARY

Gephebase Gene
GST (https://www.gephebase.org/search-criteria?/and+Gene Gephebase=^GST^#gephebase-summary-title)

GepheID
GP00002643

Entry Status
Published

Main curator
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

Latin Name
Nilaparvata lugens (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Nilaparvata lugens^#gephebase-summary-title)

Common Name
brown planthopper

Synonyms
brown planthopper; Nilaparvata lugens (Stal, 1854); Nalaparvata lugens

Rank
species

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

Parent
Nilaparvata () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 108930)

NCBI Taxonomy ID
108931 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 108931)

is Taxon A an Infraspecies?
No

Taxon B

Latin Name
Nilaparvata lugens (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Nilaparvata lugens^#gephebase-summary-title)

Common Name
brown planthopper

Synonyms
brown planthopper; Nilaparvata lugens (Stal, 1854); Nalaparvata lugens

Rank
species

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

Parent
Nilaparvata () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 108930)

NCBI Taxonomy ID
108931 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 108931)

is Taxon B an Infraspecies?
No

GENOTYPIC CHANGE

Generic Gene Name
GstD1

Synonyms
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; Gst1.1; GSTase; gstD; GstD; gstd1; gstD1; GSTD1; T5; GSTD1-1

String
7227.FBpp0099824 (http://string-db.org/newstring_cgi/show_network_section.pl?identifier= 7227.FBpp0099824)

Sequence Similarities
Belongs to the GST superfamily. Delta family.

GO - Molecular Function
GO:0004364 : glutathione transferase activity (https://www.ebi.ac.uk/QuickGO/term/GO:0004364)
GO:0004602 : glutathione peroxidase activity (https://www.ebi.ac.uk/QuickGO/term/GO:0004602)

UniProtKB Drosophila melanogaster
P20432 (http://www.uniprot.org/uniprot/P20432)

GenebankID or UniProtKB
()

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