GEPHE SUMMARY

Gephebase Gene
esterase NI-EST1 (https://www.gephebase.org/search-criteria?/and+Gene Gephebase=^esterase NI-EST1^#gephebase-summary-title)

GepheID
GP00002638

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 (organophosphorus insecticides) (https://www.gephebase.org/search-criteria?/and+Trait=^Xenobiotic resistance (organophosphorus insecticides)^#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
Ces1

Synonyms
CEH; Ces1; Ces-1; Ses-1; Ces1g

String
10090.ENSMUSP00000037555 (http://string-db.org/newstring_cgi/show_network_section.pl?identifier=10090.ENSMUSP00000037555)

Sequence Similarities
Belongs to the type-B carboxylesterase/lipase family.

GO - Molecular Function
GO:0052689 : carboxylic ester hydrolase activity (https://www.ebi.ac.uk/QuickGO/term/GO:0052689)
GO:0080030 : methyl indole-3-acetate esterase activity (https://www.ebi.ac.uk/QuickGO/term/GO:0080030)
GO:0004771 : sterol esterase activity (https://www.ebi.ac.uk/QuickGO/term/GO:0004771)

GO - Biological Process

UniProtKB Mus musculus
Q8VCC2 (http://www.uniprot.org/uniprot/Q8VCC2)

GenebankID or UniProtKB
()

GO:0009617 : response to bacterium (https://www.ebi.ac.uk/QuickGO/term/GO:0009617)
GO:0006695 : cholesterol biosynthetic process
(https://www.ebi.ac.uk/QuickGO/term/GO:0006695)
GO:0042632 : cholesterol homeostasis
(https://www.ebi.ac.uk/QuickGO/term/GO:0042632)
GO:0008203 : cholesterol metabolic process
(https://www.ebi.ac.uk/QuickGO/term/GO:0008203)
GO:0034378 : chylomicron assembly (https://www.ebi.ac.uk/QuickGO/term/GO:0034378)
GO:0010875 : positive regulation of cholesterol efflux
(https://www.ebi.ac.uk/QuickGO/term/GO:0010875)
GO:0043691 : reverse cholesterol transport
(https://www.ebi.ac.uk/QuickGO/term/GO:0043691)
GO:0010468 : regulation of gene expression
(https://www.ebi.ac.uk/QuickGO/term/GO:0010468)
GO:0016042 : lipid catabolic process (https://www.ebi.ac.uk/QuickGO/term/GO:0016042)
GO:0030855 : epithelial cell differentiation
(https://www.ebi.ac.uk/QuickGO/term/GO:0030855)
GO:0010887 : negative regulation of cholesterol storage
(https://www.ebi.ac.uk/QuickGO/term/GO:0010887)
GO:0071397 : cellular response to cholesterol
(https://www.ebi.ac.uk/QuickGO/term/GO:0071397)
GO:0071404 : cellular response to low-density lipoprotein particle stimulus
(https://www.ebi.ac.uk/QuickGO/term/GO:0071404)
GO:0051791 : medium-chain fatty acid metabolic process
(https://www.ebi.ac.uk/QuickGO/term/GO:0051791)
GO:0090205 : positive regulation of cholesterol metabolic process
(https://www.ebi.ac.uk/QuickGO/term/GO:0090205)
GO:0070857 : regulation of bile acid biosynthetic process
(https://www.ebi.ac.uk/QuickGO/term/GO:0070857)
GO:0120188 : regulation of bile acid secretion
(https://www.ebi.ac.uk/QuickGO/term/GO:0120188)
GO:0090320 : regulation of chylomicron remnant clearance
(https://www.ebi.ac.uk/QuickGO/term/GO:0090320)
GO:0090207 : regulation of triglyceride metabolic process
(https://www.ebi.ac.uk/QuickGO/term/GO:0090207)

GO - Cellular Component

GO:0005737 : cytoplasm (https://www.ebi.ac.uk/QuickGO/term/GO:0005737)
GO:0005783 : endoplasmic reticulum
(https://www.ebi.ac.uk/QuickGO/term/GO:0005783)
GO:0005788 : endoplasmic reticulum lumen
(https://www.ebi.ac.uk/QuickGO/term/GO:0005788)
GO:0005811 : lipid droplet (https://www.ebi.ac.uk/QuickGO/term/GO:0005811)

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

-

Molecular Details of the Mutation

Southern analysis of genomic DNA from the Sri Lankan OP-resistant and susceptible strains suggests that the NI-EST1 esterase gene is amplified in the resistant strain

Experimental Evidence

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

Main Reference

Molecular characterization of the amplified carboxylesterase gene associated with organophosphorus insecticide resistance in the brown planthopper, Nilaparvata lugens. (2000)
(https://pubmed.ncbi.nlm.nih.gov/11122474)

Authors

Small GJ; Hemingway J

Abstract

Widespread resistance to organophosphorus insecticides (OPs) in Nilaparvata lugens is associated with elevation of carboxylesterase activity. A cDNA encoding a carboxylesterase, NI-EST1, has been isolated from an OP-resistant Sri Lankan strain of N. lugens. The full-length cDNA codes for a 547-amino acid protein with high homology to other esterases/lipases. NI-EST1 has an N-terminal hydrophobic signal peptide sequence of 24 amino acids which suggests that the mature protein is secreted from cells expressing it. The nucleotide sequence of the homologue of NI-EST1 in an OP-susceptible, low esterase Sri Lankan strain of N. lugens is identical to NI-EST1. Southern analysis of genomic DNA from the Sri Lankan OP-resistant and susceptible strains suggests that NI-EST1 is amplified in the resistant strain. Therefore, resistance to OPs in the Sri Lankan strain is through amplification of a gene identical to that found in the susceptible strain.

Additional References

RELATED GEPHE

Related Genes

4 (Acetylcholinesterase (Ace-1), CYP6AY1, CYP6ER1, GST) (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