GEPHE SUMMARY

Gephebase Gene

Acetylcholinesterase (Ace-1) (https://www.gephebase.org/search-criteria?/and+Gene Gephebase=^Acetylcholinesterase (Ace-1)^#gephebase-summary-title)

GepheID

GP00002572

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 (insecticide) (https://www.gephebase.org/search-criteria?/and+Trait=^Xenobiotic resistance (insecticide)^#gephebase-summary-title)

Trait State in Taxon A

Tetranychus urticae - sensitive

Trait State in Taxon B

Tetranychus urticae - 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

Tetranychus urticae (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Tetranychus urticae^#gephebase-summary-title)

Common Name

two-spotted spider mite

Synonyms

two-spotted spider mite; red spider mite; twospotted mite; Tetranychus urticae Koch, 1836

Rank

species

Lineage

cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Protostomia; Ecdysozoa; Panarthropoda; Arthropoda; Chelicerata; Arachnida; Acari; Acariformes; Trombidiformes; Prostigmata; Eleutherengona; Raphignathae; Tetranychoidea; Tetranychidae; Tetranychus

Parent

Tetranychus () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 32263)

NCBI Taxonomy ID

32264 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 32264)

is Taxon A an Infraspecies?

No

Taxon B

Latin Name

Tetranychus urticae (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Tetranychus urticae^#gephebase-summary-title)

Common Name

two-spotted spider mite

Synonyms

two-spotted spider mite; red spider mite; twospotted mite; Tetranychus urticae Koch, 1836

Rank

species

Lineage

cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Protostomia; Ecdysozoa; Panarthropoda; Arthropoda; Chelicerata; Arachnida; Acari; Acariformes; Trombidiformes; Prostigmata; Eleutherengona; Raphignathae; Tetranychoidea; Tetranychidae; Tetranychus

Parent

Tetranychus () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 32263)

NCBI Taxonomy ID

32264 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 32264)

is Taxon B an Infraspecies?

No

GENOTYPIC CHANGE

Generic Gene Name

Ace

Synonyms

AcChE; ace; ACE; ace-2; ache; AchE; AChE; CG17907; CHE; dAChE; dmAChE; DmAChE; Dmel\CG17907; Dm_ace; FBgn0000024; l(3)26; l(3)87Ed

String

7227.FBpp0289713 (http://string-db.org/newstring_cgi/show_network_section.pl?identifier= 7227.FBpp0289713)

Sequence Similarities

Belongs to the type-B carboxylesterase/lipase family.

GO - Molecular Function

GO:0042803 : protein homodimerization activity (https://www.ebi.ac.uk/QuickGO/term/GO:0042803)
GO:0003990 : acetylcholinesterase activity (https://www.ebi.ac.uk/QuickGO/term/GO:0003990)
GO:0004104 : cholinesterase activity (https://www.ebi.ac.uk/QuickGO/term/GO:0004104)
GO:0043199 : sulfate binding (https://www.ebi.ac.uk/QuickGO/term/GO:0043199)

UniProtKB Drosophila melanogaster

P07140 (http://www.uniprot.org/uniprot/P07140)

GenebankID or UniProtKB

()

GO - Biological Process

GO:0006581 : acetylcholine catabolic process (https://www.ebi.ac.uk/QuickGO/term/GO:0006581)
GO:0001507 : acetylcholine catabolic process in synaptic cleft (https://www.ebi.ac.uk/QuickGO/term/GO:0001507)
GO:0007268 : chemical synaptic transmission (https://www.ebi.ac.uk/QuickGO/term/GO:0007268)
GO:0042426 : choline catabolic process (https://www.ebi.ac.uk/QuickGO/term/GO:0042426)
GO:0042331 : phototaxis (https://www.ebi.ac.uk/QuickGO/term/GO:0042331)

GO - Cellular Component

GO:0005886 : plasma membrane (https://www.ebi.ac.uk/QuickGO/term/GO:0005886)
GO:0005737 : cytoplasm (https://www.ebi.ac.uk/QuickGO/term/GO:0005737)
GO:0031225 : anchored component of membrane (https://www.ebi.ac.uk/QuickGO/term/GO:0031225)
GO:0030054 : cell junction (https://www.ebi.ac.uk/QuickGO/term/GO:0030054)
GO:0043083 : synaptic cleft (https://www.ebi.ac.uk/QuickGO/term/GO:0043083)

Presumptive Null

No (https://www.gephebase.org/search-criteria?/and+Presumptive Null=^No^#gephebase-summary-title)

Molecular Type

Coding (https://www.gephebase.org/search-criteria?/and+Molecular Type=^Coding^#gephebase-summary-title)

Aberration Type

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

SNP Coding Change

Nonsynonymous

Molecular Details of the Mutation

G328A

Experimental Evidence

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

	Taxon A	Taxon B	Position
Codon	-	-	-
Amino-acid	-	-	-

Main Reference

Sequence of a cDNA encoding acetylcholinesterase from susceptible and resistant two-spotted spider mite, Tetranychus urticae. (2003) (https://pubmed.ncbi.nlm.nih.gov/12706630)

Authors

Anazawa Y; Tomita T; Aiki Y; Kozaki T; Kono Y

Abstract

Acetylcholinesterase (AChE) from two-spotted spider mites, Tetranychus urticae was compared between an organophosphate susceptible (TKD) and a resistant (NCN) strain. The AChE of TKD had lower affinity to acetylthiocholine and propionylthiocholine than that of NCN, and the inhibition of AChE by DDVP, ambenonium, eserine and n-methyl-eserine showed that NCN was more insensitive than TKD. AChE cDNA sequence was determined, and the 687 amino acids of primary structure were deduced. There were six replacements of amino acid residues in TKD and two in NCN. #F331(439)C was the only substitution unique to NCN, however, this mutation existed homozygously in only two out of nine mites. This residue is one of the gorge lining components, and #F331(439)C might act an important role in the sensitivity of AChE to the inhibitors.

Additional References

Genotype to phenotype, the molecular and physiological dimensions of resistance in arthropods. (2015) (https://pubmed.ncbi.nlm.nih.gov/26047113)
Acetylcholinesterase point mutations in European strains of Tetranychus urticae (Acari: Tetranychidae) resistant to organophosphates. (2010) (https://pubmed.ncbi.nlm.nih.gov/19894225)

RELATED GEPHE

Related Genes

8 (Chitin synthase 1 (CHS1), CPR, CYP392A16, CYP392E8, cytochrome b, glutamate-gated chloride channel (GluCl), para (kdr), PSST) (https://www.gephebase.org/search-criteria?/or+Taxon ID=^32264^/and+Trait=Xenobiotic resistance/and+groupHaplotypes=true#gephebase-summary-title)

Related Haplotypes

5 (https://www.gephebase.org/search-criteria?/or+Gene Gephebase=^Acetylcholinesterase (Ace-1)^/and+Taxon ID=^32264^/or+Gene Gephebase=^Acetylcholinesterase (Ace-1)^/and+Taxon ID=^32264^#gephebase-summary-title)

EXTERNAL LINKS

COMMENTS