GEPHE SUMMARY

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

GepheID
GP00002013

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

A201S

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)
Acaricide resistance and resistance mechanisms in Tetranychus urticae populations from rose greenhouses in the Netherlands. (2011) (https://pubmed.ncbi.nlm.nih.gov/21548003)

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