

GEPHE SUMMARY

<p>glutamate-gated chloride channel (GluCl) (https://www.gephebase.org/search-criteria?/and+Gene+Gephebase=^glutamate-gated+chloride+channel+(GluCl)^#gephebase-summary-title)</p> <p>Published</p>	<p>Gephebase Gene</p> <p>GP00002601</p> <p>Courtier</p> <p>Entry Status</p>	<p>GepheID</p> <p>Main curator</p>
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PHENOTYPIC CHANGE

<p>Physiology (https://www.gephebase.org/search-criteria?/and+Trait+Category=^Physiology^#gephebase-summary-title)</p> <p>Xenobiotic resistance (insecticide; abamectin) (https://www.gephebase.org/search-criteria?/and+Trait=^Xenobiotic+resistance+(insecticide;+abamectin)^#gephebase-summary-title)</p> <p>Tetranychus urticae - sensitive</p> <p>Tetranychus urticae - resistant</p> <p>Taxon A</p> <p>Intraspecific (https://www.gephebase.org/search-criteria?/and+Taxonomic+Status=^Intraspecific^#gephebase-summary-title)</p>	<p>Trait Category</p> <p>Trait</p> <p>Trait State in Taxon A</p> <p>Trait State in Taxon B</p> <p>Ancestral State</p> <p>Taxonomic Status</p>	<p>Taxon A</p> <p>Taxon B</p>
<p>Tetranychus urticae (https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=^Tetranychus+urticae^#gephebase-summary-title)</p> <p>two-spotted spider mite</p> <p>two-spotted spider mite; red spider mite; twospotted mite; Tetranychus urticae Koch, 1836 species</p> <p>cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Protostomia; Ecdysozoa; Panarthropoda; Arthropoda; Chelicerata; Arachnida; Acari; Acariformes; Trombidiformes; Prostigmata; Eleutherengona; Raphignathae; Tetranychoidae; Tetranychidae; Tetranychus</p> <p>Tetranychus () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=32263)</p> <p>32264 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=32264)</p> <p>No</p>	<p>Latin Name</p> <p>Common Name</p> <p>Synonyms</p> <p>Rank</p> <p>Lineage</p> <p>Parent</p> <p>NCBI Taxonomy ID</p> <p>is Taxon A an Intraspecies?</p>	<p>Tetranychus urticae (https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=^Tetranychus+urticae^#gephebase-summary-title)</p> <p>two-spotted spider mite</p> <p>two-spotted spider mite; red spider mite; twospotted mite; Tetranychus urticae Koch, 1836 species</p> <p>cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Protostomia; Ecdysozoa; Panarthropoda; Arthropoda; Chelicerata; Arachnida; Acari; Acariformes; Trombidiformes; Prostigmata; Eleutherengona; Raphignathae; Tetranychoidae; Tetranychidae; Tetranychus</p> <p>Tetranychus () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=32263)</p> <p>32264 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=32264)</p> <p>No</p>

GENOTYPIC CHANGE

<p>GluClalpha</p> <p>BcDNA:HL07853; CG7535; CT23049; dGluCl-alpha; Dm-GluCl; Dmel\CG7535; DmGlu; DmGluClalpha; DrosGlu-Cl-alpha; DrosGluCl; DrosGluCl-alpha; DrosGluCl-alpha1; glc; glu; GluCl; GLUCL; GluClA; gluClalpha; GluClalpha1</p> <p>7227.FBpp0099473 (http://string-db.org/newstring.cgi/show_network_section.pl?identifier=7227.FBpp0099473)</p> <p>Belongs to the ligand-gated ion channel (TC 1.A.9) family. Glutamate-gated chloride channel (TC 1.A.9.4) subfamily.</p> <p>GO:0004888 : transmembrane signaling receptor activity (https://www.ebi.ac.uk/QuickGO/term/GO:0004888)</p>	<p>Generic Gene Name</p> <p>Synonyms</p> <p>String</p> <p>Sequence Similarities</p> <p>GO - Molecular Function</p>	<p>UniProtKB Drosophila melanogaster</p> <p>Q94900 (http://www.uniprot.org/uniprot/Q94900)</p> <p>GenebankID or UniProtKB</p> <p>()</p>
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GO:1904315 : transmitter-gated ion channel activity involved in regulation of postsynaptic membrane potential (<https://www.ebi.ac.uk/QuickGO/term/GO:1904315>)
 GO:0005231 : excitatory extracellular ligand-gated ion channel activity (<https://www.ebi.ac.uk/QuickGO/term/GO:0005231>)
 GO:0008068 : extracellularly glutamate-gated chloride channel activity (<https://www.ebi.ac.uk/QuickGO/term/GO:0008068>)
 GO:0030594 : neurotransmitter receptor activity (<https://www.ebi.ac.uk/QuickGO/term/GO:0030594>)

GO - Biological Process

GO:0007165 : signal transduction (<https://www.ebi.ac.uk/QuickGO/term/GO:0007165>)
 GO:0007268 : chemical synaptic transmission (<https://www.ebi.ac.uk/QuickGO/term/GO:0007268>)
 GO:0034220 : ion transmembrane transport (<https://www.ebi.ac.uk/QuickGO/term/GO:0034220>)
 GO:0050877 : nervous system process (<https://www.ebi.ac.uk/QuickGO/term/GO:0050877>)
 GO:0042391 : regulation of membrane potential (<https://www.ebi.ac.uk/QuickGO/term/GO:0042391>)
 GO:1902476 : chloride transmembrane transport (<https://www.ebi.ac.uk/QuickGO/term/GO:1902476>)
 GO:0006821 : chloride transport (<https://www.ebi.ac.uk/QuickGO/term/GO:0006821>)

GO - Cellular Component

GO:0016021 : integral component of membrane (<https://www.ebi.ac.uk/QuickGO/term/GO:0016021>)
 GO:0005887 : integral component of plasma membrane (<https://www.ebi.ac.uk/QuickGO/term/GO:0005887>)
 GO:0043005 : neuron projection (<https://www.ebi.ac.uk/QuickGO/term/GO:0043005>)
 GO:0045211 : postsynaptic membrane (<https://www.ebi.ac.uk/QuickGO/term/GO:0045211>)
 GO:0045202 : synapse (<https://www.ebi.ac.uk/QuickGO/term/GO:0045202>)
 GO:0034707 : chloride channel complex (<https://www.ebi.ac.uk/QuickGO/term/GO:0034707>)
 GO:0070161 : anchoring junction (<https://www.ebi.ac.uk/QuickGO/term/GO:0070161>)

Presumptive Null

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

Molecular Type

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

Aberration Type

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

SNP Coding Change

Nonsynonymous

Molecular Details of the Mutation

G326E in Tu_GluCl3

Experimental Evidence

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

	Taxon A	Taxon B	Position
Codon	-	-	-
Amino-acid	Gly	Glu	326

Main Reference

The cys-loop ligand-gated ion channel gene family of *Tetranychus urticae*: implications for acaricide toxicology and a novel mutation associated with abamectin resistance. (2012) (<https://pubmed.ncbi.nlm.nih.gov/22465149>)

Authors

Dermauw W; Ilias A; Riga M; Tsagkarakou A; Grbić M; Tirry L; Van Leeuwen T; Vontas J

Abstract

The cys-loop ligand-gated ion channel (cysLGIC) super family of *Tetranychus urticae*, the two-spotted spider mite, represents the largest arthropod cysLGIC super family described to date and the first characterised one within the group of chelicerates. Genome annotation, phylogenetic analysis and comparison of the cysLGIC subunits with their counterparts in insects reveals that the *T. urticae* genome encodes for a high number of glutamate- and histamine-gated chloride channel genes (GluCl and HisCl) compared to insects. Three orthologues of the insect β -aminobutyric acid (GABA)-gated chloride channel gene *Rdl* were detected. Other cysLGIC groups, such as the nAChR subunits, are more conserved and have clear insect orthologues. Members of cysLGIC family mediate endogenous chemical neurotransmission and they are prime targets of insecticides. Implications for toxicology associated with the identity and specific features of *T. urticae* family members are discussed. We further reveal the accumulation of known and novel mutations in different GluCl channel subunits (Tu_GluCl1 and Tu_GluCl3) associated with abamectin resistance in *T. urticae*, and provide genetic evidence for their causality. Our study provides useful toxicological insights for the exploration of the *T. urticae* cysLGIC subunits as putative molecular targets for current and future chemical control strategies.

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Additional References

RELATED GEPHE

Related Genes

8 (Acetylcholinesterase (Ace-1), Chitin synthase 1 (CHS1), CPR, CYP392A16, CYP392E8, cytochrome b, para (kdr), PSSST) (<https://www.gephebase.org/search-criteria?/or+Taxon>)

ID=[^]32264[^]/and+Trait=Xenobiotic resistance/and+groupHaplotypes=true#gepbase-summary-title)

Related Haplotypes

1 ([https://www.gepbase.org/search-criteria?/or+Gene+Gepbase=[^]glutamate-gated chloride channel \(GluCl\)[^]/and+Taxon ID=[^]32264[^]/or+Gene+Gepbase=[^]glutamate-gated chloride channel \(GluCl\)[^]/and+Taxon ID=[^]32264[^]#gepbase-summary-title](https://www.gepbase.org/search-criteria?/or+Gene+Gepbase=[^]glutamate-gated chloride channel (GluCl)[^]/and+Taxon ID=[^]32264[^]/or+Gene+Gepbase=[^]glutamate-gated chloride channel (GluCl)[^]/and+Taxon ID=[^]32264[^]#gepbase-summary-title))

EXTERNAL LINKS

COMMENTS

There are six orthologous GluCl genes in the genome of *T. urticae*.