

GEPHE SUMMARY

para (kdr) ([https://www.gephebase.org/search-criteria?/and+Gene Gephebase="+para \(kdr\)+"#gephebase-summary-title](https://www.gephebase.org/search-criteria?/and+Gene+Gephebase=))

Gephebase Gene GP00000851

Entry Status Martin

Published

GepheID Main curator

PHENOTYPIC CHANGE

Physiology ([https://www.gephebase.org/search-criteria?/and+Trait Category="+Physiology+"#gephebase-summary-title](https://www.gephebase.org/search-criteria?/and+Trait+Category=))

Trait Category

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

Trait

Tuta absoluta

Trait State in Taxon A

Tuta absoluta - resistant

Trait State in Taxon B

Taxon A

Ancestral State

Intraspecific ([https://www.gephebase.org/search-criteria?/and+Taxonomic Status="+Intraspecific+"#gephebase-summary-title](https://www.gephebase.org/search-criteria?/and+Taxonomic+Status=))

Taxonomic Status

Taxon A	Latin Name	Taxon B	Latin Name
Tuta absoluta (<a +tuta+absoluta+"#gephebase-summary-title"="" href="https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=">https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms="+Tuta absoluta"#gephebase-summary-title)		Tuta absoluta (<a +tuta+absoluta+"#gephebase-summary-title"="" href="https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=">https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms="+Tuta absoluta"#gephebase-summary-title)	
-	Common Name	-	Common Name
Gnorimoschema absoluta; Phthorimaea absoluta; Scrobipalpula absoluta; Scrobipalpuloides absoluta; Tuta absoluta (Meyrick, 1917)	Synonyms	Gnorimoschema absoluta; Phthorimaea absoluta; Scrobipalpula absoluta; Scrobipalpuloides absoluta; Tuta absoluta (Meyrick, 1917)	Synonyms
species	Rank	species	Rank
cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Protostomia; Ecdysozoa; Panarthropoda; Arthropoda; Mandibulata; Pancrustacea; Hexapoda; Insecta; Dicondylia; Pterygota; Neoptera; Holometabola; Amphimesnoptera; Lepidoptera; Glossata; Neolepidoptera; Heteroneura; Dityrsia; Gelechioidea; Gelechiidae; Gelechiinae; Tuta	Lineage	cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Protostomia; Ecdysozoa; Panarthropoda; Arthropoda; Mandibulata; Pancrustacea; Hexapoda; Insecta; Dicondylia; Pterygota; Neoptera; Holometabola; Amphimesnoptera; Lepidoptera; Glossata; Neolepidoptera; Heteroneura; Dityrsia; Gelechioidea; Gelechiidae; Gelechiinae; Tuta	Lineage
Tuta () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=702716)	Parent	Tuta () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=702716)	Parent
702717 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=702717)	NCBI Taxonomy ID	702717 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=702717)	NCBI Taxonomy ID
No	is Taxon A an Intraspecies?	No	is Taxon B an Intraspecies?

GENOTYPIC CHANGE

para

Generic Gene Name P35500 (<http://www.uniprot.org/uniprot/P35500>)

UniProtKB Drosophila melanogaster

bas; bss; CG9907; Dmel\CG9907; DmNav; DmNav1; DmNa[[v]]; DmNa[[V]]; DmNa[[v]]1; l(1)14Da; l(1)ESH548; lincRNA.S9469; Nav1; Ocd; olfD; par; sbl; sbl-1; Shu; Shudderer

String

7227.FBpp0303597
(http://string-db.org/newstring.cgi/show_network_section.pl?identifier=7227.FBpp0303597)

Sequence Similarities

Belongs to the sodium channel (TC 1.A.1.10) family. Para subfamily.

GO - Molecular Function

GO:0005509 : calcium ion binding (<https://www.ebi.ac.uk/QuickGO/term/GO:0005509>)

GO:0005244 : voltage-gated ion channel activity (<https://www.ebi.ac.uk/QuickGO/term/GO:0005244>)

GO:0005248 : voltage-gated sodium channel activity

GenebankID or UniProtKB

(<https://www.ebi.ac.uk/QuickGO/term/GO:0005248>)

GO:0005272 : sodium channel activity

(<https://www.ebi.ac.uk/QuickGO/term/GO:0005272>)

GO - Biological Process

GO:0045433 : male courtship behavior, veined wing generated song production

(<https://www.ebi.ac.uk/QuickGO/term/GO:0045433>)

GO:0001666 : response to hypoxia (<https://www.ebi.ac.uk/QuickGO/term/GO:0001666>)

GO:0009612 : response to mechanical stimulus

(<https://www.ebi.ac.uk/QuickGO/term/GO:0009612>)

GO:0034765 : regulation of ion transmembrane transport

(<https://www.ebi.ac.uk/QuickGO/term/GO:0034765>)

GO:0035725 : sodium ion transmembrane transport

(<https://www.ebi.ac.uk/QuickGO/term/GO:0035725>)

GO:0007638 : mechanosensory behavior

(<https://www.ebi.ac.uk/QuickGO/term/GO:0007638>)

GO:0060078 : regulation of postsynaptic membrane potential

(<https://www.ebi.ac.uk/QuickGO/term/GO:0060078>)

GO - Cellular Component

GO:0005887 : integral component of plasma membrane

(<https://www.ebi.ac.uk/QuickGO/term/GO:0005887>)

GO:0001518 : voltage-gated sodium channel complex

(<https://www.ebi.ac.uk/QuickGO/term/GO:0001518>)

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

M918T

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	-	-	-

Main Reference

Identification of mutations associated with pyrethroid resistance in the voltage-gated sodium channel of the tomato leaf miner (*Tuta absoluta*). (2012)

(<https://pubmed.ncbi.nlm.nih.gov/22504519>)

Authors

Haddi K; Berger M; Bielza P; Cifuentes D; Field LM; Gorman K; Rapisarda C; Williamson MS; Bass C

Abstract

The tomato leaf miner, *Tuta absoluta* (Lepidoptera) is a significant pest of tomatoes that has undergone a rapid expansion in its range during the past six years and is now present across Europe, North Africa and parts of Asia. One of the main means of controlling this pest is through the use of chemical insecticides. In the current study insecticide bioassays were used to determine the susceptibility of five *T. absoluta* strains established from field collections from Europe and Brazil to pyrethroids. High levels of resistance to λ cyhalothrin and tau fluralinate were observed in all five strains tested. To investigate whether pyrethroid resistance was mediated by mutation of the para-type sodium channel in *T. absoluta* the IIS4-IIS6 region of the para gene, which contains many of the mutation sites previously shown to confer knock down (kdr)-type resistance to pyrethroids across a range of different arthropod species, was cloned and sequenced. This revealed that three kdr/super-kdr-type mutations (M918T, T929I and L1014F), were present at high frequencies within all five resistant strains at known resistance 'hot-spots'. This is the first description of these mutations together in any insect population. High-throughput DNA-based diagnostic assays were developed and used to assess the prevalence of these mutations in 27 field strains from 12 countries. Overall mutant allele frequencies were high (L1014F 0.98, M918T 0.35, T929I 0.60) and remarkably no individual was observed that did not carry kdr in combination with either M918T or T929I. The presence of these mutations at high frequency in *T. absoluta* populations across much of its range suggests pyrethroids are likely to be ineffective for control and supports the idea that the rapid expansion of this species over the last six years may be in part mediated by the resistance of this pest to chemical insecticides.

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Additional References

RELATED GEPHE

Related Genes

2 (nAChR, RYR) ([https://www.gephebase.org/search-criteria?/or+Taxon ID="+702717^/and+Trait=Xenobiotic resistance/and+groupHaplotypes=true#gephebase-summary-title](https://www.gephebase.org/search-criteria?/or+Taxon+ID=))

Related Haplotypes

4 ([https://www.gephebase.org/search-criteria?/or+Gene Gephebase="+para \(kdr\)^/and+Taxon ID="+702717^/or+Gene Gephebase="+para \(kdr\)^/and+Taxon ID="+702717^#gephebase-summary-title](https://www.gephebase.org/search-criteria?/or+Gene+Gephebase=))

EXTERNAL LINKS

COMMENTS