

GEPHE SUMMARY

para (kdr) (https://www.gephebase.org/search-criteria?/and+Gene Gephebase='para (kdr)'#gephebase-summary-title)	Generic Gene Name	GP00002510	GepheID
	Entry Status	Courtier	Main curator
Published			

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		
Plutella xylostella	Trait State in Taxon B		
Plutella xylostella - resistant - crashdown allele	Ancestral State		
Data not curated	Taxonomic Status		
Intraspecific (https://www.gephebase.org/search-criteria?/and+Taxonomic Status='Intraspecific'#gephebase-summary-title)			
Taxon A	Latin Name	Taxon B	Latin Name
Plutella xylostella (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms='Plutella xylostella'#gephebase-summary-title)		Plutella xylostella (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms='Plutella xylostella'#gephebase-summary-title)	
diamondback moth	Common Name	diamondback moth	Common Name
diamondback moth; cabbage moth; Plutella xylostella (Linnaeus, 1758); Putella xylostella	Synonyms	diamondback moth; cabbage moth; Plutella xylostella (Linnaeus, 1758); Putella xylostella	Synonyms
	Rank		Rank
species	Lineage	species	Lineage
cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Protostomia; Ecdysozoa; Panarthropoda; Arthropoda; Mandibulata; Pancrustacea; Hexapoda; Insecta; Dicondylia; Pterygota; Neoptera; Holometabola; Amphiesmenoptera; Lepidoptera; Glossata; Neolepidoptera; Heteroneura; Ditrysia; Yponomeutoidea; Plutellidae; Plutella		cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Protostomia; Ecdysozoa; Panarthropoda; Arthropoda; Mandibulata; Pancrustacea; Hexapoda; Insecta; Dicondylia; Pterygota; Neoptera; Holometabola; Amphiesmenoptera; Lepidoptera; Glossata; Neolepidoptera; Heteroneura; Ditrysia; Yponomeutoidea; Plutellidae; Plutella	
Plutella () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 51654)	Parent	Plutella () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 51654)	Parent
51655 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 51655)	NCBI Taxonomy ID	51655 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 51655)	NCBI Taxonomy ID
No	is Taxon A an Infraspecies?	No	is Taxon B an Infraspecies?

GENOTYPIC CHANGE

	Generic Gene Name		
para	Synonyms	UniProtKB Drosophila melanogaster	
bas; bss; CG9907; Dmel\CG9907; DmNav; DmNav1; DmNa[[v]]; DmNa[[V]]; DmNa[[v]]; I(1)14Da; I(1)ESHS48; lincRNA.S9469; Nav1; Ocd; olfD; par; sbl; sbl-1; Shu; Shudderer	String	P35500 (http://www.uniprot.org/uniprot/P35500)	GenebankID or UniProtKB
7227.FBpp0303597 (http://string-db.org/newstring_cgi/show_network_section.pl?identifier= 7227.FBpp0303597)	Sequence Similarities	ALE32646 (https://www.ncbi.nlm.nih.gov/nucleotide/ALE32646)	
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 (https://www.ebi.ac.uk/QuickGO/term/GO:0005248)			
GO:0005272 : sodium channel activity			

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>)

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

F1020S

Experimental Evidence

Linkage Mapping (<https://www.gephebase.org/search-criteria?/and+Experimental+Evidence=%Linkage+Mapping%#gephebase-summary-title>)

	Taxon A	Taxon B	Position
Codon	-	-	-
Amino-acid	Phe	Ser	1020

Main Reference

Widespread pyrethroid resistance in Australian diamondback moth, *Plutella xylostella* (L.), is related to multiple mutations in the para sodium channel gene. (2011)
 (<https://pubmed.ncbi.nlm.nih.gov/21342603>)

Authors

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Abstract

Populations of *Plutella xylostella*, extending over 3800 km in southern Australia, show no genetic structure as assessed by microsatellite markers; yet outbreaks of pyrethroid resistance occur sporadically in cropping areas. Since mutations in the para voltage-gated sodium channel gene have been implicated in pyrethroid resistance, we looked for DNA sequence variation at this target among Australian moths. We found two resistance mutations previously reported for this species (L1014F and T929I), as well as a novel substitution (F1020S). Of the eight possible haplotypes formed by combinations of these three biallelic polymorphisms, only four were found in Australian populations: the wild-type allele (w), the kdr mutation allele (kdr) with only L1014F, the super-kdr-like combination of L1014F and T929I (skdrI), and the crashdown allele with only F1020S (cdr). Comparison of genotype frequencies among survivors of permethrin assays with those from untreated controls identified three resistant genotypes: skdrI homozygotes, cdr homozygotes and the corresponding heterozygote, cdr/skdrI - the heterozygote being at least as resistant as either homozygote. Spatial heterogeneity of allele frequencies was conspicuous, both across the continent and among local collections, consistent with reported spatial heterogeneity of pyrethroid resistance. Further, high resistance samples were sometimes associated with high frequency of cdr, sometimes high frequency of skdrI, or sometimes with a high combined cdr+skdrI frequency. The skdrI and cdr alleles explain a high proportion of the Australia-wide resistance variation. These data add to evidence that nerve insensitivity by mutations in the para-sodium channel gene is a common pyrethroid resistance mechanism in *P. xylostella*.

Additional References

Molecular biology of insect sodium channels and pyrethroid resistance. (2014) (<https://pubmed.ncbi.nlm.nih.gov/24704279>)

RELATED GEPHE

Related Genes

10 (ABCC2, Acetylcholinesterase (Ace-1), Chitin synthase 1 (CHS1), CYP6BG1, FMO2, glutamate-gated chloride channel (GluCl), MAP4K4, nAChR, resistance to dieldrin, RYR)
 (<https://www.gephebase.org/search-criteria?/or+Taxon+ID=%51655%/and+Trait=Xenobiotic+resistance/and+groupHaplotypes=true#gephebase-summary-title>)

Related Haplotypes

4 ([https://www.gephebase.org/search-criteria?/or+Gene+Gephebase=%para+\(kdr\)%/and+Taxon+ID=%51655%/or+Gene+Gephebase=%para+\(kdr\)%/and+Taxon+ID=%51655%#gephebase-summary-title](https://www.gephebase.org/search-criteria?/or+Gene+Gephebase=%para+(kdr)%/and+Taxon+ID=%51655%/or+Gene+Gephebase=%para+(kdr)%/and+Taxon+ID=%51655%#gephebase-summary-title))

EXTERNAL LINKS

COMMENTS