

	Gephebase Gene	GepheID
para (kdr) (<a +para+(kdr)+"#gepbase-summary-title"="" href="https://www.gephebase.org/search-criteria?/and+Gene+Gephebase=">https://www.gephebase.org/search-criteria?/and+Gene Gephebase="+para (kdr)+"#gepbase-summary-title)	GP00002615	Main curator
	Entry Status: Courtier	
Published		

Trait Category		Trait	
Physiology (#https://www.gephebase.org/search-criteria?/and+TraitCategory=~Physiology)			
Xenobiotic resistance (insecticide) (https://www.gephebase.org/search-criteria?/and+Trait=~Xenobiotic resistance (insecticide))			
	Trait State in Taxon A		
Myzus persicae			
	Trait State in Taxon B		
Myzus persicae - resistant			
	Ancestral State		
Taxon A			
	Taxonomic Status		
Intraspecific (#https://www.gephebase.org/search-criteria?/and+TaxonomicStatus=~Intraspecific)			
Taxon A		Taxon B	
Myzus persicae (#https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=~Myzus persicae)	Latin Name	Myzus persicae (#https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=~Myzus persicae)	Latin Name
	Common Name		Common Name
green peach aphid		green peach aphid	
	Synonyms		Synonyms
Myzus (Nectarosiphon) persicae; green peach aphid; peach-potato aphid; Myzus persicae (Sulzer, 1776); Myzus persicaeae		Myzus (Nectarosiphon) persicae; green peach aphid; peach-potato aphid; Myzus persicae (Sulzer, 1776); Myzus persicaeae	
	Rank		Rank
species		species	
	Lineage		Lineage
cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Protostomia; Ecdysozoa; Panarthropoda; Arthropoda; Mandibulata; Pancrustacea; Hexapoda; Insecta; Dicondylia; Pterygota; Neoptera; Paraneoptera; Hemiptera; Sternorrhyncha; Aphidomorpha; Aphidoidea; Aphididae; Aphidinae; Macrosiphini; Myzus		cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Protostomia; Ecdysozoa; Panarthropoda; Arthropoda; Mandibulata; Pancrustacea; Hexapoda; Insecta; Dicondylia; Pterygota; Neoptera; Paraneoptera; Hemiptera; Sternorrhyncha; Aphidomorpha; Aphidoidea; Aphididae; Aphidinae; Macrosiphini; Myzus	
	Parent		Parent
Myzus () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=13163)		Myzus () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=13163)	
	NCBI Taxonomy ID		NCBI Taxonomy ID
13164 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=13164)		13164 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=13164)	
	is Taxon A an Intraspecies?		is Taxon B an Intraspecies?
No		No	

para	Generic Gene Name	UniProtKB Drosophila melanogaster
bas; bss; CG9907; Dmel\CG9907; DmNav; DmNav1; DmNa[[v]]; DmNa[[V]]; DmNa[[v]]1; l(1)14Da; l(1)ESHS48; lincRNA.S9469; Nav1; Ocd; olfD; par; sbl; sbl-1; Shu; Shudderer	Synonyms	GenebankID or UniProtKB
7227.FBpp0303597 (http://string-db.org/newstring.cgi/show_network_section.pl?identifier= 7227.FBpp0303597)	String	P35500 (http://www.uniprot.org/uniprot/P35500) CAM98294 (https://www.ncbi.nlm.nih.gov/nuccore/CAM98294)
	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 (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>)

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

M918I ATG>ATA

Experimental Evidence

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

	Taxon A	Taxon B	Position
Codon	ATG	ATT	-
Amino-acid	Met	Ile	918

Main Reference

Global patterns in genomic diversity underpinning the evolution of insecticide resistance in the aphid crop pest *Myzus persicae*. (2021) (<https://pubmed.ncbi.nlm.nih.gov/34234279>)

Authors

Singh KS; Cordeiro EMG; Troczka BJ; Pym A; Mackisack J; Mathers TC; Duarte A; Legeai F; Robin S; Bielza P; Burrack HJ; Charaabi K; Denholm I; Figueroa CC; Ffrench-Constant RH; Jander G; Margaritopoulos JT; Mazzoni E; Nauen R; Ram rez CC; Ren G; Stepanyan I; Umina PA; Voronova NV; Vontas J; Williamson MS; Wilson ACC; Xi-Wu G; Youn YN; Zimmer CT; Simon JC; Hayward A; Bass C

Abstract

The aphid *Myzus persicae* is a destructive agricultural pest that displays an exceptional ability to develop resistance to both natural and synthetic insecticides. To investigate the evolution of resistance in this species we generated a chromosome-scale genome assembly and living panel of >110 fully sequenced globally sampled clonal lines. Our analyses reveal a remarkable diversity of resistance mutations segregating in global populations of *M. persicae*. We show that the emergence and spread of these mechanisms is influenced by host-plant associations, uncovering the widespread co-option of a host-plant adaptation that also offers resistance against synthetic insecticides. We identify both the repeated evolution of independent resistance mutations at the same locus, and multiple instances of the evolution of novel resistance mechanisms against key insecticides. Our findings provide fundamental insights into the genomic responses of global insect populations to strong selective forces, and hold practical relevance for the control of pests and parasites.

Additional References

The molecular interactions of pyrethroid insecticides with insect and mammalian sodium channels. (2001) (<https://pubmed.ncbi.nlm.nih.gov/11695180>)

RELATED GEPHE

Related Genes

8 (acetyl-CoA carboxylase (ACC), Acetylcholinesterase (Ace-1), CYP6CY3, CYP6CY3-CYP6CY4, esterase E4, esterase FE4, nAChR, resistance to dieldrin)
(<https://www.gephebase.org/search-criteria?/or+Taxon ID=~13164~/and+Trait=Xenobiotic resistance/and+groupHaplotypes=true#gephebase-summary-title>)

Related Haplotypes

7 ([https://www.gephebase.org/search-criteria?/or+Gene Gephebase=~para \(kdr\)~/and+Taxon ID=~13164~/or+Gene Gephebase=~para \(kdr\)~/and+Taxon ID=~13164~#gephebase-summary-title](https://www.gephebase.org/search-criteria?/or+Gene Gephebase=~para (kdr)~/and+Taxon ID=~13164~/or+Gene Gephebase=~para (kdr)~/and+Taxon ID=~13164~#gephebase-summary-title))

EXTERNAL LINKS

COMMENTS

Two alternative codons encoding isoleucine were observed in the 13 clones carrying M918I: 5 clones with the codon ATT and 8 clones with the codon ATA. This suggests that the same amino acid substitution has independently evolved on at least two occasions.