

GEPHE SUMMARY

	Gephebase Gene	GepheID
acetyl-CoA carboxylase (ACC) (https://www.gephebase.org/search-criteria/?and+Gene) Gephebase=^acetyl-CoA carboxylase (ACC)^#gephebase-summary-title)	GP00002616	
Published	Entry Status	Main curator

PHENOTYPIC CHANGE

	Trait Category		
Physiology (https://www.gephebase.org/search-criteria/?and+Trait) Category=^Physiology^#gephebase-summary-title)	Trait		
Xenobiotic resistance (insecticide; spirotetramat) (https://www.gephebase.org/search-criteria/?and+Trait=^Xenobiotic+resistance+(insecticide;+spirotetramat)^#gephebase-summary-title)	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+Taxonomic Status=^Intraspecific^#gephebase-summary-title)			
	Taxon A	Taxon B	
	Latin Name	Latin Name	
Myzus persicae (https://www.gephebase.org/search-criteria/?and+Taxon+and+Synonyms=^Myzus+persicae^#gephebase-summary-title)	Myzus persicae (https://www.gephebase.org/search-criteria/?and+Taxon+and+Synonyms=^Myzus+persicae^#gephebase-summary-title)	Myzus persicae (https://www.gephebase.org/search-criteria/?and+Taxon+and+Synonyms=^Myzus+persicae^#gephebase-summary-title)	Common Name
green peach aphid	Common Name	Common Name	
Myzus (Nectarosiphon) persicae; green peach aphid; peach-potato aphid; Myzus persicae (Sulzer, 1776); Myzus persiceae	Synonyms	Myzus (Nectarosiphon) persicae; green peach aphid; peach-potato aphid; Myzus persicae (Sulzer, 1776); Myzus persiceae	Synonyms
species	Rank	Rank	
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	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	Lineage
Myzus () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=13163)	Parent	Myzus () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=13163)	Parent
13164 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=13164)	NCBI Taxonomy ID	13164 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=13164)	NCBI Taxonomy ID
No	is Taxon A an Infraspecies?	No	is Taxon B an Infraspecies?

GENOTYPIC CHANGE

	Generic Gene Name	UniProtKB Drosophila melanogaster
ACC		
A1Z784_DROME; acc; Acc; ACoT; CG11198; CG8723; dACC; DmACC; Dmel\CG11198; FBgn0043811; Dmel_CG11198	Synonyms	GenebankID or UniProtKB
-	String	0
-	Sequence Similarities	
-	GO - Molecular Function	
GO:0005524 : ATP binding (https://www.ebi.ac.uk/QuickGO/term/GO:0005524)		
GO:0046872 : metal ion binding (https://www.ebi.ac.uk/QuickGO/term/GO:0046872)		
GO:0003989 : acetyl-CoA carboxylase activity (https://www.ebi.ac.uk/QuickGO/term/GO:0003989)		
GO:0006633 : fatty acid biosynthetic process	GO - Biological Process	

(<https://www.ebi.ac.uk/QuickGO/term/GO:0006633>)
 GO:0019432 : triglyceride biosynthetic process
 (<https://www.ebi.ac.uk/QuickGO/term/GO:0019432>)
 GO:0009744 : response to sucrose (<https://www.ebi.ac.uk/QuickGO/term/GO:0009744>)
 GO:0000902 : cell morphogenesis (<https://www.ebi.ac.uk/QuickGO/term/GO:0000902>)
 GO:0005977 : glycogen metabolic process
 (<https://www.ebi.ac.uk/QuickGO/term/GO:0005977>)
 GO:0071329 : cellular response to sucrose stimulus
 (<https://www.ebi.ac.uk/QuickGO/term/GO:0071329>)
 GO:2001295 : malonyl-CoA biosynthetic process
 (<https://www.ebi.ac.uk/QuickGO/term/GO:2001295>)

GO - Cellular Component

GO:0005737 : cytoplasm (<https://www.ebi.ac.uk/QuickGO/term/GO:0005737>)
 GO:0005739 : mitochondrion (<https://www.ebi.ac.uk/QuickGO/term/GO:0005739>)

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

a single non-synonymous mutation (gC>T) resulting in an alanine to valine substitution in a highly conserved region of the ACC carboxyltransferase (CT) domain

Experimental Evidence

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

	Taxon A	Taxon B	Position
Codon	GCT	GTT	-
Amino-acid	Ala	Val	2226

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; Charabi K; Denholm I; Figueroa CC; Ffrench-Constant RH; Jander G; Margaritopoulos JT; Mazzoni E; Nauen R; Ramírez 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

RELATED GEPHE

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

Related Haplotypes

No matches found.

EXTERNAL LINKS

COMMENTS

