

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)		GP00002617	
Published	Entry Status	Courtier	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		
Caenorhabditis elegans - sensitive			
	Trait State in Taxon B		
Caenorhabditis elegans - resistant line after mutagenesis and selection			
	Ancestral State		
Taxon A			
	Taxonomic Status		
Experimental Evolution (https://www.gephebase.org/search-criteria?/and+Taxonomic Status= [^] Experimental Evolution [^] #gephebase-summary-title)			
Taxon A		Taxon B	
	Latin Name		Latin Name
Caenorhabditis elegans (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms= [^] Caenorhabditis elegans [^] #gephebase-summary-title)		Caenorhabditis elegans (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms= [^] Caenorhabditis elegans [^] #gephebase-summary-title)	
	Common Name		Common Name
-		-	
	Synonyms		Synonyms
roundworm; Rhabditis elegans; Caenorhabditis elegans (Maupas, 1900); Rhabditis elegans Maupas, 1900		roundworm; Rhabditis elegans; Caenorhabditis elegans (Maupas, 1900); Rhabditis elegans Maupas, 1900	
	Rank		Rank
species		species	
	Lineage		Lineage
cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Protostomia; Ecdysozoa; Nematoda; Chromadorea; Rhabditida; Rhabditina; Rhabditomorpha; Rhabditoidea; Rhabditidae; Peloderinae; Caenorhabditis		cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Protostomia; Ecdysozoa; Nematoda; Chromadorea; Rhabditida; Rhabditina; Rhabditomorpha; Rhabditoidea; Rhabditidae; Peloderinae; Caenorhabditis	
	Parent		Parent
Caenorhabditis () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=6237)		Caenorhabditis () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=6237)	
6239 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=6239)	NCBI Taxonomy ID	6239 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=6239)	NCBI Taxonomy ID
	is Taxon A an Intraspecies?		is Taxon B an Intraspecies?
No		No	

GENOTYPIC CHANGE

	Generic Gene Name		UniProtKB Drosophila melanogaster
ACC		Q7JV23 (http://www.uniprot.org/uniprot/Q7JV23)	
	Synonyms		GenebankID or UniProtKB
A1Z784_DROME; acc; Acc; ACoT; CG11198; CG8723; dACC; DmACC; Dmel\CG11198; FBgn0043811; Dmel_CG11198		()	
	String		
-			
	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 - Biological Process		
GO:0006633 : fatty acid biosynthetic 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

A1559V

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	Ala	Val	-

Main Reference

Studies of an insecticidal inhibitor of acetyl-CoA carboxylase in the nematode *C. elegans*. (2020) (https://pubmed.ncbi.nlm.nih.gov/32828380)

Authors

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Abstract

We have studied the mode of action of the insecticide spirotetramat in the nematode *Caenorhabditis elegans*. A combination of symptomology, forward genetics and genome editing show that spirotetramat acts on acetyl-CoA carboxylase (ACC) in *C. elegans*, as it does in insects. We found *C. elegans* embryos exposed to spirotetramat show a cell division defect which closely resembles the phenotype of loss-of-function mutations in the gene *pod-2*, which encodes ACC. We then identified two mutations in the carboxyl transferase domain of *pod-2* (ACC) which confer resistance and were confirmed using CRISPR/Cas9. One of these mutations substitutes an invertebrate-specific amino acid with one ubiquitous in other taxa; this residue may, therefore, be a determinant of the selectivity of spirotetramat for invertebrates. Such a mutation may also be the target of selection for resistance in the field. Our study is a further demonstration of the utility of *C. elegans* in studying bioactive chemicals.

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Additional References

RELATED GEPHE

Related Genes

3 (beta-tubulin (ben-1), GLC-1, str-217) (https://www.gephebase.org/search-criteria?/or+Taxon ID=^6239^/and+Trait=Xenobiotic resistance/and+groupHaplotypes=true#gephebase-summary-title)

Related Haplotypes

1 (https://www.gephebase.org/search-criteria?/or+Gene Gephebase=^acetyl-CoA carboxylase (ACC)^/and+Taxon ID=^6239^/or+Gene Gephebase=^acetyl-CoA carboxylase (ACC)^/and+Taxon ID=^6239^#gephebase-summary-title)

EXTERNAL LINKS

COMMENTS

