

## GEPHE SUMMARY

|  |                |            |              |
|--|----------------|------------|--------------|
|  | Gephebase Gene |            | GepheID      |
| para (kdr) ( <a +para+(kdr)+"#gephebase-summary-title"="" href="https://www.gephebase.org/search-criteria?/and+Gene+Gephebase=">https://www.gephebase.org/search-criteria?/and+Gene+Gephebase="+para+(kdr)+"#gephebase-summary-title</a> ) |                | GP00000830 |              |
| Published  | Entry Status   | Martin     | Main curator |

## PHENOTYPIC CHANGE

|   |                             |   |                             |
|---|-----------------------------|---|-----------------------------|
|   | Trait Category              |   |                             |
| Physiology ( <a +physiology+"#gephebase-summary-title"="" href="https://www.gephebase.org/search-criteria?/and+Trait+Category=">https://www.gephebase.org/search-criteria?/and+Trait+Category="+Physiology+"#gephebase-summary-title</a> )  |                             |   |                             |
|   | Trait                       |   |                             |
| Xenobiotic resistance (insecticide) ( <a +xenobiotic+resistance+(insecticide)+"#gephebase-summary-title"="" href="https://www.gephebase.org/search-criteria?/and+Trait=">https://www.gephebase.org/search-criteria?/and+Trait="+Xenobiotic+resistance+(insecticide)+"#gephebase-summary-title</a> )   |                             |   |                             |
|   | Trait State in Taxon A      |   |                             |
| Cydia pomonella   |                             |   |                             |
|   | Trait State in Taxon B      |   |                             |
| Cydia pomonella - resistant   |                             |   |                             |
|   | Ancestral State             |   |                             |
| Taxon A   |                             |   |                             |
|   | Taxonomic Status            |   |                             |
| Intraspecific ( <a +intraspecific+"#gephebase-summary-title"="" href="https://www.gephebase.org/search-criteria?/and+Taxonomic+Status=">https://www.gephebase.org/search-criteria?/and+Taxonomic+Status="+Intraspecific+"#gephebase-summary-title</a> )   |                             |   |                             |
| Taxon A   |                             | Taxon B   |                             |
|   | Latin Name                  |   | Latin Name                  |
| Cydia pomonella<br>( <a +cydia+pomonella+"#gephebase-summary-title"="" href="https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=">https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms="+Cydia+pomonella+"#gephebase-summary-title</a> )  |                             | Cydia pomonella<br>( <a +cydia+pomonella+"#gephebase-summary-title"="" href="https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=">https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms="+Cydia+pomonella+"#gephebase-summary-title</a> )  |                             |
|   | Common Name                 |   | Common Name                 |
| codling moth  |                             | codling moth  |                             |
|   | Synonyms                    |   | Synonyms                    |
| codling moth; Cydia pomonella (Linnaeus, 1758)  |                             | codling moth; Cydia pomonella (Linnaeus, 1758)  |                             |
|   | Rank                        |   | Rank                        |
| species   |                             | species   |                             |
|   | Lineage                     |   | 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; Ditrysia; Apoditrysia; Tortricoidea; Tortricidae; Olethreutinae; Grapholitini; Cydia |                             | cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Protostomia; Ecdysozoa; Panarthropoda; Arthropoda; Mandibulata; Pancrustacea; Hexapoda; Insecta; Dicondylia; Pterygota; Neoptera; Holometabola; Amphimesnoptera; Lepidoptera; Glossata; Neolepidoptera; Heteroneura; Ditrysia; Apoditrysia; Tortricoidea; Tortricidae; Olethreutinae; Grapholitini; Cydia |                             |
|   | Parent                      |   | Parent                      |
| Cydia () - (Rank: genus)<br>( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=82599">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=82599</a> )   |                             | Cydia () - (Rank: genus)<br>( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=82599">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=82599</a> )   |                             |
|   | NCBI Taxonomy ID            |   | NCBI Taxonomy ID            |
| 82600<br>( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=82600">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=82600</a> )  |                             | 82600<br>( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=82600">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=82600</a> )  |                             |
|   | is Taxon A an Infrappecies? |   | is Taxon B an Infrappecies? |
| No  |                             | No  |                             |

## GENOTYPIC CHANGE

|   |                         |  |                                   |
|---|-------------------------|--|-----------------------------------|
|   | Generic Gene Name       |  | UniProtKB Drosophila melanogaster |
| para  |                         | P35500 ( <a href="http://www.uniprot.org/uniprot/P35500">http://www.uniprot.org/uniprot/P35500</a> ) | GenebankID or UniProtKB           |
|   | Synonyms                |  |                                   |
| bas; bss; CG9907; Dmel\CG9907; DmNav; DmNav1; DmNa[[v]]; DmNa[[V]]; DmNa[[v]]1; I(1)14Da; I(1)ESHS48; lincRNA.S9469; Nav1; Ocd; olfD; par; sbl; sbl-1; Shu; Shudderer   |                         | ()   |                                   |
|   | String                  |  |                                   |
| 7227.FBpp0303597<br>( <a href="http://string-db.org/newstring.cgi/show_network_section.pl?identifier=7227.FBpp0303597">http://string-db.org/newstring.cgi/show_network_section.pl?identifier=7227.FBpp0303597</a> ) |                         |  |                                   |
|   | Sequence Similarities   |  |                                   |
| Belongs to the sodium channel (TC 1.A.1.10) family. Para subfamily.   |                         |  |                                   |
|   | GO - Molecular Function |  |                                   |
| GO:0005509 : calcium ion binding ( <a href="https://www.ebi.ac.uk/QuickGO/term/GO:0005509">https://www.ebi.ac.uk/QuickGO/term/GO:0005509</a> )  |                         |  |                                   |
| GO:0005244 : voltage-gated ion channel activity<br>( <a href="https://www.ebi.ac.uk/QuickGO/term/GO:0005244">https://www.ebi.ac.uk/QuickGO/term/GO:0005244</a> )  |                         |  |                                   |
| GO:0005248 : voltage-gated sodium channel activity<br>( <a href="https://www.ebi.ac.uk/QuickGO/term/GO:0005248">https://www.ebi.ac.uk/QuickGO/term/GO:0005248</a> )   |                         |  |                                   |

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>)

No (<https://www.gephebase.org/search-criteria?/and+Presumptive Null=~No^#gephebase-summary-title>) Presumptive Null

Coding (<https://www.gephebase.org/search-criteria?/and+Molecular Type=~Coding^#gephebase-summary-title>) Molecular Type

SNP (<https://www.gephebase.org/search-criteria?/and+Aberration Type=~SNP^#gephebase-summary-title>) Aberration Type

Nonsynonymous SNP Coding Change

L1014F Molecular Details of the Mutation

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

|            | Taxon A | Taxon B | Position |
|------------|---------|---------|----------|
| Codon      | -       | -       | -        |
| Amino-acid | -       | -       | -        |

Main Reference

Involvement of a sodium channel mutation in pyrethroid resistance in *Cydia pomonella* L. and development of a diagnostic test. (2005) (<https://pubmed.ncbi.nlm.nih.gov/15657957>)

Authors

Brun-Barale A; Bouvier JC; Pauron D; BergÃ© JB; Sauphanor B

Abstract

Populations of the codling moth, *Cydia pomonella* L (Lepidoptera, Tortricidae) have developed resistance to several classes of insecticide such as benzoylureas, juvenile hormone analogues, ecdysone agonists and pyrethroids, but the corresponding resistance mechanisms have not been extensively studied. Knockdown resistance (kdr) to pyrethroid insecticides has been associated with point mutations in the para sodium channel gene in a great variety of insect pest species. We have studied two susceptible strains (S and Sv) and two resistant strains (Rt and Rv) of *C. pomonella* that exhibited 4- and 80-fold resistance ratios to deltamethrin, respectively. The region of the voltage-dependent sodium channel gene which includes the position where kdr and super-kdr mutations have been found in *Musca domestica* L was amplified. The kdr mutation, a leucine-to-phenylalanine replacement at position 1014, was found only in the Rv strain. In contrast, the super-kdr mutation, a methionine-to-threonine replacement at position 918, was not detected in any *C. pomonella* strain. These data allowed us to develop a PCR-based diagnostic test (PASA) to monitor the frequency of the kdr mutation in natural populations of *C. pomonella* in order to define appropriate insecticide treatments in orchards.

Additional References

Multiple origins of the sodium channel kdr mutations in codling moth populations. (2012) (<https://pubmed.ncbi.nlm.nih.gov/22912889>)

RELATED GEPHE

Related Genes

1 (Acetylcholinesterase (Ace-1)) (<https://www.gephebase.org/search-criteria?/or+Taxon ID=~82600^/and+Trait=Xenobiotic resistance/and+groupHaplotypes=true#gephebase-summary-title>)

Related Haplotypes

No matches found.

EXTERNAL LINKS

COMMENTS

The mutation likely appeared several times in different haplotypes.