

## GEPHE SUMMARY

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> )	Gephebase Gene	GP00002537	GepheID
Published	Entry Status	Courtier	Main curator

## PHENOTYPIC CHANGE

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 Category		
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		
Anopheles albimanus	Trait State in Taxon A		
Anopheles albimanus - resistant	Trait State in Taxon B		
Taxon A	Ancestral State		
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> )	Taxonomic Status		

Taxon A	Latin Name	Taxon B	Latin Name
Anopheles albimanus ( <a +anopheles+albimanus+"#gephebase-summary-title"="" href="https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=">https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms="+Anopheles+albimanus+"#gephebase-summary-title</a> )	Anopheles albimanus ( <a +anopheles+albimanus+"#gephebase-summary-title"="" href="https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=">https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms="+Anopheles+albimanus+"#gephebase-summary-title</a> )	Anopheles albimanus ( <a +anopheles+albimanus+"#gephebase-summary-title"="" href="https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=">https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms="+Anopheles+albimanus+"#gephebase-summary-title</a> )	Anopheles albimanus ( <a +anopheles+albimanus+"#gephebase-summary-title"="" href="https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=">https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms="+Anopheles+albimanus+"#gephebase-summary-title</a> )
-	Common Name	-	Common Name
-	Synonyms	-	Synonyms
species	Rank	species	Rank
cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Protostomia; Ecdysozoa; Panarthropoda; Arthropoda; Mandibulata; Pancrustacea; Hexapoda; Insecta; Dicondylia; Pterygota; Neoptera; Holometabola; Diptera; Nematocera; Culicomorpha; Culicoidea; Culicidae; Anophelinae; Anopheles; Nyssorhynchus; albimanus section; albimanus series	Lineage	cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Protostomia; Ecdysozoa; Panarthropoda; Arthropoda; Mandibulata; Pancrustacea; Hexapoda; Insecta; Dicondylia; Pterygota; Neoptera; Holometabola; Diptera; Nematocera; Culicomorpha; Culicoidea; Culicidae; Anophelinae; Anopheles; Nyssorhynchus; albimanus section; albimanus series	Lineage
albimanus series () - (Rank: no rank) ( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=44547">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=44547</a> )	Parent	albimanus series () - (Rank: no rank) ( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=44547">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=44547</a> )	Parent
7167 ( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=7167">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=7167</a> )	NCBI Taxonomy ID	7167 ( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=7167">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=7167</a> )	NCBI Taxonomy ID
No	is Taxon A an Infrasppecies?	No	is Taxon B an Infrasppecies?

## GENOTYPIC CHANGE

para	Generic Gene Name	P35500 ( <a href="http://www.uniprot.org/uniprot/P35500">http://www.uniprot.org/uniprot/P35500</a> )	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 ( <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> )	String		
Belongs to the sodium channel (TC.1.A.1.10) family. Para subfamily.	Sequence Similarities		
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 - Molecular Function		
GO:0005244 : voltage-gated ion channel activity ( <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 ( <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  
L1014C in Nicaragua and Costa Rica individuals 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	-	-	-

Molecular evidence for historical presence of knock-down resistance in *Anopheles albimanus*, a key malaria vector in Latin America. (2013) (<https://pubmed.ncbi.nlm.nih.gov/24330978>) Main Reference

Lol JC; Castellanos ME; Liebman KA; Lenhart A; Pennington PM; Padilla NR Authors

**Abstract**  
*Anopheles albimanus* is a key malaria vector in the northern neotropics. Current vector control measures in the region are based on mass distributions of long-lasting insecticidal nets (LLINs) and focal indoor residual spraying (IRS) with pyrethroids. Resistance to pyrethroid insecticides can be mediated by increased esterase and/or multi-function oxidase activity and/or mutations in the voltage-gated sodium channel gene. The aim of this work was to characterize the homologous *kdr* region of the voltage-gated sodium channel gene in *An. albimanus* and to conduct a preliminary retrospective analysis of field samples collected in the 1990's, coinciding with a time of intense pyrethroid application related to agricultural and public health insect control in the region.

Degenerate primers were designed to amplify the homologous *kdr* region in a pyrethroid-susceptible laboratory strain (Sanarate) of *An. albimanus*. Subsequently, a more specific primer pair was used to amplify and sequence the region that contains the 1014 codon associated with pyrethroid resistance in other *Anopheles* spp. (L1014F, L1014S or L1014C).

Direct sequencing of the PCR products confirmed the presence of the susceptible *kdr* allele in the Sanarate strain (L1014) and the presence of homozygous-resistant *kdr* alleles in field-collected individuals from Mexico (L1014F), Nicaragua (L1014C) and Costa Rica (L1014C).

For the first time, the *kdr* region in *An. albimanus* is described. Furthermore, molecular evidence suggests the presence of *kdr*-type resistance in field-collected *An. albimanus* in Mesoamerica in the 1990s. Further research is needed to conclusively determine an association between the genotypes and resistant phenotypes, and to what extent they may compromise current vector control efforts.

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

RELATED GEPHE

1 (Acetylcholinesterase (Ace-1)) (<https://www.gephebase.org/search-criteria?/or+Taxon ID=~7167^/and+Trait=Xenobiotic resistance/and+groupHaplotypes=true#gephebase-summary-title>) Related Genes

1 ([https://www.gephebase.org/search-criteria?/or+Gene Gephebase=~para \(kdr\)^/and+Taxon ID=~7167^/or+Gene Gephebase=~para \(kdr\)^/and+Taxon ID=~7167^#gephebase-summary-title](https://www.gephebase.org/search-criteria?/or+Gene Gephebase=~para (kdr)^/and+Taxon ID=~7167^/or+Gene Gephebase=~para (kdr)^/and+Taxon ID=~7167^#gephebase-summary-title)) Related Haplotypes

EXTERNAL LINKS

COMMENTS