

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)	GP00000819	
	Entry Status	Main curator
Published		

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)			
	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)			
	Trait State in Taxon A		
Anopheles gambiae			
	Trait State in Taxon B		
Anopheles gambiae - resistant - allele 1			
	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)			
		Taxon B	
	Latin Name		Latin Name
Anopheles gambiae (<a +anopheles+gambiae+"#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+gambiae+"#gephebase-summary-title)		Anopheles gambiae (<a +anopheles+gambiae+"#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+gambiae+"#gephebase-summary-title)	
	Common Name		Common Name
African malaria mosquito		African malaria mosquito	
	Synonyms		Synonyms
Anopheles gambiae S; African malaria mosquito; Anopheles gambiae Giles, 1902; Anopheles gambia		Anopheles gambiae S; African malaria mosquito; Anopheles gambiae Giles, 1902; Anopheles gambia	
	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; Diptera; Nematocera; Culicomorpha; Culicoidea; Culicidae; Anophelinae; Anopheles; Cellia; Pyretophorus; gambiae species complex		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; Cellia; Pyretophorus; gambiae species complex	
	Parent		Parent
gambiae species complex () - (Rank: no rank) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=44542)		gambiae species complex () - (Rank: no rank) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=44542)	
	NCBI Taxonomy ID		NCBI Taxonomy ID
7165 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=7165)		7165 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=7165)	
	is Taxon A an Intraspecies?		is Taxon B an Intraspecies?
No		No	

GENOTYPIC CHANGE

	Generic Gene Name	UniProtKB Drosophila melanogaster
para		P35500 (http://www.uniprot.org/uniprot/P35500)
	Synonyms	GenebankID or UniProtKB
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		KKI21527 (https://www.ncbi.nlm.nih.gov/nuccore/KKI21527)
	String	
7227.FBpp0303597 (http://string-db.org/newstring.cgi/show_network_section.pl?identifier=7227.FBpp0303597)		
	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>)

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	-	-	-

Molecular characterization of pyrethroid knockdown resistance (kdr) in the major malaria vector <i>Anopheles gambiae</i> s.s. (1998) (https://pubmed.ncbi.nlm.nih.gov/9535162)	Main Reference
Martinez-Torres D; Chandre F; Williamson MS; Darriet F; Berg�� JB; Devonshire AL; Guillet P; Pasteur N; Pauron D	Authors
Pyrethroid-impregnated bednets are playing an increasing role for combating malaria, especially in stable malaria areas. More than 90% of the current annual malaria incidence (c. 500 million clinical cases with up to 2 million deaths) is in Africa where the major vector is <i>Anopheles gambiae</i> s.s. As pyrethroid resistance has been reported in this mosquito, reliable and simple techniques are urgently needed to characterize and monitor this resistance in the field. In insects, an important mechanism of pyrethroid resistance is due to a modification of the voltage-gated sodium channel protein recently shown to be associated with mutations of the para-type sodium channel gene. We demonstrate here that one of these mutations is present in certain strains of pyrethroid resistant <i>A. gambiae</i> s.s. and describe a PCR-based diagnostic test allowing its detection in the genome of single mosquitoes. Using this test, we found this mutation in six out of seven field samples from West Africa, its frequency being closely correlated with survival to pyrethroid exposure. This diagnostic test should bring major improvement for field monitoring of pyrethroid resistance, within the framework of malaria control programmes.	Abstract
CRISPR/Cas9 modified <i>An. gambiae</i> carrying kdr mutation L1014F functionally validate its contribution in insecticide resistance and combined effect with metabolic enzymes. (2021) (https://pubmed.ncbi.nlm.nih.gov/34228718)	Additional References

RELATED GEPHE

3 (Acetylcholinesterase (Ace-1), resistance to dieldrin, SAP-2) (https://www.gephebase.org/search-criteria?/or+Taxon ID=^7165^/and+Trait=Xenobiotic resistance/and+groupHaplotypes=true#gephebase-summary-title)	Related Genes
2 (https://www.gephebase.org/search-criteria?/or+Gene Gephebase=^para (kdr)^/and+Taxon ID=^7165^/or+Gene Gephebase=^para (kdr)^/and+Taxon ID=^7165^#gephebase-summary-title)	Related Haplotypes

EXTERNAL LINKS

COMMENTS

@Introgression This allele has also introgressed into *Anopheles coluzzi* (previoulsy named *Anopheles gambiae* M form) (Weill et al 2000 - The kdr mutation occurs in the Mopti form of *Anopheles gambiae*s. through introgression)