

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)	Gephebase Gene	GP00002444	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)	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)	Trait	
Aedes aegypti	Trait State in Taxon A	
Aedes aegypti - resistant from Malaysia	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)	Taxonomic Status	

Taxon A	Latin Name	Taxon B	Latin Name
Aedes aegypti (<a +aedes+aegypti^#gephebase-summary-title"="" href="https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=">https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms="+Aedes+aegypti^#gephebase-summary-title)	Aedes aegypti (<a +aedes+aegypti^#gephebase-summary-title"="" href="https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=">https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms="+Aedes+aegypti^#gephebase-summary-title)	Aedes aegypti (<a +aedes+aegypti^#gephebase-summary-title"="" href="https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=">https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms="+Aedes+aegypti^#gephebase-summary-title)	Aedes aegypti (<a +aedes+aegypti^#gephebase-summary-title"="" href="https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=">https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms="+Aedes+aegypti^#gephebase-summary-title)
yellow fever mosquito	Common Name	yellow fever mosquito	Common Name
Stegomyia aegypti; yellow fever mosquito; Aedes aegypti (Linnaeus, 1762)	Synonyms	Stegomyia aegypti; yellow fever mosquito; Aedes aegypti (Linnaeus, 1762)	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; Culicinae; Aedini; Aedes; Stegomyia	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; Culicinae; Aedini; Aedes; Stegomyia	Lineage
Stegomyia () - (Rank: subgenus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=53541)	Parent	Stegomyia () - (Rank: subgenus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=53541)	Parent
7159 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=7159)	NCBI Taxonomy ID	7159 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=7159)	NCBI Taxonomy ID
No	is Taxon A an Intraspecies?	No	is Taxon B an Intraspecies?

GENOTYPIC CHANGE

para	Generic Gene Name	UniProtKB Drosophila melanogaster
bas; bss; CG9907; Dmel\CG9907; DmNav; DmNav1; DmNa[[v]]; DmNa[[V]]; DmNa[[v]]1; l(1)14Da; l(1)ESH548; lincRNA.S9469; Nav1; Occl; olfD; par; sbl; sbl-1; Shu; Shudderer	Synonyms	GenebankID or UniProtKB
7227.FBpp0303597 (http://string-db.org/newstring.cgi/show_network_section.pl?identifier=7227.FBpp0303597)	String	
Belongs to the sodium channel (TC 1.A.1.10) family. Para subfamily.	Sequence Similarities	
GO:0005509 : calcium ion binding (https://www.ebi.ac.uk/QuickGO/term/GO:0005509)	GO - Molecular Function	
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>)

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

V1016G

Experimental Evidence

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

	Taxon A	Taxon B	Position
Codon	GTA	GGA	-
Amino-acid	Val	Gly	1016

Main Reference

Contrasting patterns of insecticide resistance and knockdown resistance (kdr) in the dengue vectors *Aedes aegypti* and *Aedes albopictus* from Malaysia. (2015)

(<https://pubmed.ncbi.nlm.nih.gov/25888775>)

Authors

Ishak IH; Jaal Z; Ranson H; Wondji CS

Abstract

Knowledge on the extent, distribution and mechanisms of insecticide resistance is essential for successful insecticide-based dengue control interventions. Here, we report an extensive resistance profiling of the dengue vectors *Aedes aegypti* and *Aedes albopictus* across Malaysia and establish the contribution of knockdown resistance mechanism revealing significant contrast between both species.

Aedes mosquitoes were collected from four states in Malaysia in 2010 using ovitraps and tested against six major insecticides using WHO bioassays. Knockdown resistance (kdr) was investigated in both species.

A moderate resistance to temephos was detected from samples collected in 2010 in Penang, Kuala Lumpur, Johor Bharu and Kota Bharu ($1.5 < RR < 3.3$). A widespread and multiple resistances was observed in *Ae. aegypti* particularly against pyrethroids, DDT and bendiocarb. Mosquitoes from Kuala Lumpur consistently had the highest resistance levels and was the only population showing a moderate resistance to malathion (91% mortality). The resistance profile of *Ae. albopictus* contrasted to *Ae. aegypti* with full susceptibility to pyrethroids except in Kuala Lumpur where moderate resistance is observed. PBO synergist assays suggest metabolic resistance mechanisms play a major role in resistance in both species. Two kdr mutations, F1534C and V1016G, were detected in *Ae. aegypti* across Malaysia but neither of these mutations were found in *Ae. albopictus*. Additionally, signatures of selection were detected on the Voltage-gated sodium channel gene in *Ae. aegypti* but not in *Ae. albopictus*. The presence of the 1534C allele was significantly associated with pyrethroid resistance and an additive effect to pyrethroid resistance was observed in individuals containing both kdr alleles.

Findings from this study will help to design and implement successful insecticide-based interventions against *Ae. aegypti* and *Ae. albopictus* to improve dengue control across Malaysia.

Additional References

Pyrethroid resistance in *Aedes aegypti* and *Aedes albopictus*: Important mosquito vectors of human diseases. (2016) (<https://pubmed.ncbi.nlm.nih.gov/27742355>)

Pyrethroid and DDT cross-resistance in *Aedes aegypti* is correlated with novel mutations in the voltage-gated sodium channel gene. (2003) (<https://pubmed.ncbi.nlm.nih.gov/12680930>)

RELATED GEPHE

Related Genes

4 (ABC B4, CYP9J26, CYP9M6, resistance to dieldrin) (<https://www.gephebase.org/search-criteria?/or+Taxon ID=~7159^/and+Trait=Xenobiotic resistance/and+groupHaplotypes=true#gephebase-summary-title>)

Related Haplotypes

7 ([https://www.gephebase.org/search-criteria?/or+Gene Gephebase=~para \(kdr\)^/and+Taxon ID=~7159^/or+Gene Gephebase=~para \(kdr\)^/and+Taxon ID=~7159^#gephebase-summary-title](https://www.gephebase.org/search-criteria?/or+Gene Gephebase=~para (kdr)^/and+Taxon ID=~7159^/or+Gene Gephebase=~para (kdr)^/and+Taxon ID=~7159^#gephebase-summary-title))

EXTERNAL LINKS

COMMENTS