

GEPHE SUMMARY

Gephebase Gene GepheID  
 para (kdr) ([https://www.gephebase.org/search-criteria?/and+Gene+Gephebase="+para+\(kdr\)+"#gephebase-summary-title](https://www.gephebase.org/search-criteria?/and+Gene+Gephebase=)) GP00001699  
 Entry Status admin Main curator  
 Published

PHENOTYPIC CHANGE

Trait Category  
 Physiology ([https://www.gephebase.org/search-criteria?/and+Trait+Category="+Physiology+"#gephebase-summary-title](https://www.gephebase.org/search-criteria?/and+Trait+Category=))  
 Trait  
 Xenobiotic resistance (insecticide) ([https://www.gephebase.org/search-criteria?/and+Trait="+Xenobiotic+resistance+\(insecticide\)+"#gephebase-summary-title](https://www.gephebase.org/search-criteria?/and+Trait=))  
 Trait State in Taxon A  
 Sensitive to Pyrethroids  
 Trait State in Taxon B  
 Resistant to Pyrethroids  
 Ancestral State  
 Taxon A  
 Taxonomic Status  
 Intraspecific ([https://www.gephebase.org/search-criteria?/and+Taxonomic+Status="+Intraspecific+"#gephebase-summary-title](https://www.gephebase.org/search-criteria?/and+Taxonomic+Status=))

Taxon A	Taxon B
<p>Latin Name            Anopheles sinensis            (<a +anopheles+sinensis+"#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+sinensis+"#gephebase-summary-title</a>)</p> <p>Common Name            -</p> <p>Synonyms            Anopheles (Anopheles) sinensis; Anopheles sinensis Wiedemann, 1828</p> <p>Rank            species</p> <p>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; Anopheles; Laticorn; Myzorhynchus; hyrcanus group</p> <p>Parent            hyrcanus group () - (Rank: species group)            (<a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=59131">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=59131</a>)</p> <p>NCBI Taxonomy ID            74873            (<a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=74873">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=74873</a>)</p> <p>is Taxon A an Infrasppecies?            No</p>	<p>Latin Name            Anopheles sinensis            (<a +anopheles+sinensis+"#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+sinensis+"#gephebase-summary-title</a>)</p> <p>Common Name            -</p> <p>Synonyms            Anopheles (Anopheles) sinensis; Anopheles sinensis Wiedemann, 1828</p> <p>Rank            species</p> <p>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; Anopheles; Laticorn; Myzorhynchus; hyrcanus group</p> <p>Parent            hyrcanus group () - (Rank: species group)            (<a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=59131">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=59131</a>)</p> <p>NCBI Taxonomy ID            74873            (<a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=74873">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=74873</a>)</p> <p>is Taxon B an Infrasppecies?            No</p>

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  
 String  
 7227.FBpp0303597  
 ([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))  
 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>)

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

L1014F; Haplotype H04

Experimental Evidence

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

	Taxon A	Taxon B	Position
Codon	TTG	TTT	-
Amino-acid	Leu	Phe	1014

Main Reference

First report on co-occurrence knockdown resistance mutations and susceptibility to beta-cypermethrin in *Anopheles sinensis* from Jiangsu Province, China. (2012)  
(<https://pubmed.ncbi.nlm.nih.gov/22272229>)

Authors

Tan WL; Wang ZM; Li CX; Chu HL; Xu Y; Dong YD; Wang ZC; Chen DY; Liu H; Liu DP; Liu N; Sun J; Zhao T

Abstract

The increasing prevalence of insecticide resistance in *Anopheles sinensis*, a major vector of malaria in Jiangsu province in eastern China, threatens to compromise the successful use of insecticides in malaria control strategies. It is therefore vital to understand the insecticide resistance status of *An. sinensis* in the region. This study examined the nucleotide diversity of the para-sodium channel and knockdown resistance (*kdr*) in five field populations of adult *An. sinensis* mosquitoes collected in Jiangsu province, identifying the L1014F and L1014C substitutions for the first time. Competitive polymerase chain reaction (PCR) amplification of specific allele (cPASA) and polymerase chain reaction restriction fragment length polymorphism (PCR-RFLP) for resistance diagnosis were developed and validated. Comparing the results with direct sequencing revealed that the PCR-RFLP method was more sensitive and specific whereas the cPASA method was more convenient and suitable. The significant positive correlation between *kdr* allele frequency and bioassay-based resistance phenotype demonstrates that the frequency of L1014F and L1014C substitutions in the *kdr* gene provides a useful molecular marker for monitoring beta-cypermethrin resistance in natural populations of *An. sinensis*. Our results point to the L1014F substitution as the key mutation associated with beta-cypermethrin resistance. The high resistance and mutation frequency detected in the five populations also suggest cross-resistance with other pyrethroids may occur in *An. sinensis*, highlighting the need for further surveys to map insecticide resistance in China and the adoption of a rational management of insecticide application for resistance management and mosquito vector control.

Additional References

Landscape genetic structure and evolutionary genetics of insecticide resistance gene mutations in *Anopheles sinensis*. (2016) (<https://pubmed.ncbi.nlm.nih.gov/27108406>)

RELATED GEPHE

Related Genes

No matches found.

Related Haplotypes

6 ([https://www.gephebase.org/search-criteria?/or+Gene Gephebase=~para \(kdr\)^/and+Taxon ID=~74873^/or+Gene Gephebase=~para \(kdr\)^/and+Taxon ID=~74873^#gephebase-summary-title](https://www.gephebase.org/search-criteria?/or+Gene Gephebase=~para (kdr)^/and+Taxon ID=~74873^/or+Gene Gephebase=~para (kdr)^/and+Taxon ID=~74873^#gephebase-summary-title))

EXTERNAL LINKS

## COMMENTS

@Parallelism