

	Gephebase Gene	GepheID
para (kdr) (<a +para+(kdr)+"#gepbase-summary-title"="" href="https://www.gephebase.org/search-criteria?/and+Gene+Gephebase=">https://www.gephebase.org/search-criteria?/and+Gene+Gephebase="+para+(kdr)+"#gepbase-summary-title)	GP00002516	Main curator
Published	Entry Status: Courtier	

Trait Category		Trait	
Physiology (#Physiology #gephebase-summary-title)			
Xenobiotic resistance (insecticide) (https://www.gephebase.org/search-criteria?/and+Trait=~Xenobiotic resistance (insecticide) #gephebase-summary-title)			
	Trait State in Taxon A		
Boophilus microplus			
	Trait State in Taxon B		
Boophilus microplus - resistant			
	Ancestral State		
Taxon A			
	Taxonomic Status		
Intraspecific (#Intraspecific #gephebase-summary-title)			
Taxon A		Taxon B	
	Latin Name		Latin Name
Rhipicephalus microplus (#gephebase-summary-title)		Rhipicephalus microplus (#gephebase-summary-title)	
	Common Name		Common Name
southern cattle tick		southern cattle tick	
	Synonyms		Synonyms
Boophilus microplus; Rhipicephalus (Boophilus) microplus; southern cattle tick; cattle tick; Rhipicephalus microplus (Canestrini, 1888)		Boophilus microplus; Rhipicephalus (Boophilus) microplus; southern cattle tick; cattle tick; Rhipicephalus microplus (Canestrini, 1888)	
	Rank		Rank
species		species	
	Lineage		Lineage
cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Protostomia; Ecdysozoa; Panarthropoda; Arthropoda; Chelicerata; Arachnida; Acari; Parasitiformes; Ixodida; Ixodoidea; Ixodidae; Rhipicephalinae; Rhipicephalus; Boophilus		cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Protostomia; Ecdysozoa; Panarthropoda; Arthropoda; Chelicerata; Arachnida; Acari; Parasitiformes; Ixodida; Ixodoidea; Ixodidae; Rhipicephalinae; Rhipicephalus; Boophilus	
	Parent		Parent
Boophilus () - (Rank: subgenus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=6940)		Boophilus () - (Rank: subgenus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=6940)	
	NCBI Taxonomy ID		NCBI Taxonomy ID
6941 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=6941)		6941 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=6941)	
	is Taxon A an Intraspecies?		is Taxon B an Intraspecies?
No		No	

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)ESHS48; lincRNA.S9469; Nav1; Ocd; 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	P35500 (http://www.uniprot.org/uniprot/P35500) ACT99714 (https://www.ncbi.nlm.nih.gov/nuccore/ACT99714)
	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

G72V = G933V - G to T non-synonymous mutation at nucleotide position 214 that results in a glycine to valine substitution (G72V)

Experimental Evidence

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

	Taxon A	Taxon B	Position
Codon	GGN	GTN	-
Amino-acid	Gly	Val	933

Main Reference

Identification of a mutation in the para-sodium channel gene of the cattle tick *Rhipicephalus microplus* associated with resistance to flumethrin but not to cypermethrin. (2010)
(<https://pubmed.ncbi.nlm.nih.gov/20708620>)

Authors

Jonsson NN; Cutull   C; Corley SW; Seddon JM

Abstract

A mutation in the domain II S4-5 linker region of the para-sodium channel gene has been associated previously with synthetic pyrethroid (SP) resistance in the cattle tick (*Rhipicephalus microplus*) in Australia. This is a C  A mutation at nucleotide position 190, which results in a leucine to isoleucine amino acid substitution (L64I). In a survey of 15 cattle tick populations with known SP resistance status, sourced from Queensland and New South Wales in Australia, there was a strong relationship ($r=0.98$) between the proportion of ticks carrying the L64I homozygous resistant genotype and the survival percentage after exposure to a discriminating concentration of cypermethrin in the bioassay, as expected. However, among populations resistant only to flumethrin, the L64I homozygous genotype was not found. The sequence obtained for a 167 bp region including domain II S4-5 linker in flumethrin-resistant ticks identified a G  T non-synonymous mutation at nucleotide position 214 that results in a glycine to valine substitution (G72V). The frequency of the G72V homozygous genotype in each population was found to be moderately related to the survival percentage at the discriminating concentration of flumethrin in the larval packet test ($r=0.74$). However, a much stronger relationship between genotype and resistance to flumethrin was observed when the heterozygotes of L64I and G72V were added to the G72V homozygotes ($r=0.93$). These results suggest that there is an interaction between the two mutations in the same gene, such that flumethrin resistance might be conferred by either two copies of the G72V mutation or by being a L64I and G72V heterozygote.

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Additional References

Molecular biology of insect sodium channels and pyrethroid resistance. (2014) (<https://pubmed.ncbi.nlm.nih.gov/24704279>)
Mutations in DIIS5 and the DIIS4-S5 linker of *Drosophila melanogaster* sodium channel define binding domains for pyrethroids and DDT. (2007) (<https://pubmed.ncbi.nlm.nih.gov/17991435>)

RELATED GEPHE

Related Genes

2 (resistance to dieldrin,   2-adrenergic octopamine receptor gene (AOR)) (<https://www.gephebase.org/search-criteria?/or+Taxon ID=~6941~/and+Trait=Xenobiotic resistance/and+groupHaplotypes=true#gephebase-summary-title>)

Related Haplotypes

2 ([https://www.gephebase.org/search-criteria?/or+Gene Gephebase=~para \(kdr\)~/and+Taxon ID=~6941~/or+Gene Gephebase=~para \(kdr\)~/and+Taxon ID=~6941~#gephebase-summary-title](https://www.gephebase.org/search-criteria?/or+Gene Gephebase=~para (kdr)~/and+Taxon ID=~6941~/or+Gene Gephebase=~para (kdr)~/and+Taxon ID=~6941~#gephebase-summary-title))

EXTERNAL LINKS

