GEPHE SUMMARY

Gephebase Gene

Î²-adrenergic octopamine receptor gene (AOR) (https://www.gephebase.org/search-criteria?/and+Gene Gephebase=^Î²-adrenergic octopamine receptor gene (AOR)^#gephebase-summary-title)

GepheID

GP00002396

Entry Status

Published

Main curator

Courtier

PHENOTYPIC CHANGE

Trait Category

Physiology (https://www.gephebase.org/search-criteria?/and+Trait Category=^Physiology^#gephebase-summary-title)

Trait

Xenobiotic resistance (amitraz) (https://www.gephebase.org/search-criteria?/and+Trait=^Xenobiotic resistance (amitraz)^#gephebase-summary-title)

Trait State in Taxon A

Rhipicephalus microplus - sensitive

Trait State in Taxon B

Rhipicephalus microplus - resistant

Ancestral State

Taxon A

Taxonomic Status

Intraspecific (https://www.gephebase.org/search-criteria?/and+Taxonomic Status=^Intraspecific^#gephebase-summary-title)

Taxon A

Latin Name

Rhipicephalus microplus (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Rhipicephalus microplus^#gephebase-summary-title)

Common Name

southern cattle tick

Synonyms

Boophilus microplus; Rhipicephalus (Boophilus) microplus; southern cattle tick; cattle tick; Rhipicephalus microplus (Canestrini, 1888)

Rank

species

Lineage

cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Protostomia; Ecdysozoa; Panarthropoda; Arthropoda; Chelicerata; Arachnida; Acari; Parasitiformes; Ixodida; Ixodoidea; Ixodidae; Rhipicephalinae; Rhipicephalus; Boophilus

Parent

Boophilus () - (Rank: subgenus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 6940)

NCBI Taxonomy ID

6941 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 6941)

is Taxon A an Infraspecies?

No

Taxon B

Latin Name

Rhipicephalus microplus (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Rhipicephalus microplus^#gephebase-summary-title)

Common Name

southern cattle tick

Synonyms

Boophilus microplus; Rhipicephalus (Boophilus) microplus; southern cattle tick; cattle tick; Rhipicephalus microplus (Canestrini, 1888)

Rank

species

Lineage

cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Protostomia; Ecdysozoa; Panarthropoda; Arthropoda; Chelicerata; Arachnida; Acari; Parasitiformes; Ixodida; Ixodoidea; Ixodidae; Rhipicephalinae; Rhipicephalus; Boophilus

Parent

Boophilus () - (Rank: subgenus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 6940)

NCBI Taxonomy ID

6941 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 6941)

is Taxon B an Infraspecies?

No

GENOTYPIC CHANGE

Generic Gene Name

Oct-TyrR

Synonyms

CG7485; Dmel\CG7485; Dmoct/tyr; DmTAR1; DmTyrR; DrmOTR; hono; l(3)neo30; OA-R; OAR_DROME; Ocr; OcR; Oct/Tyr; OctoR1; OctyR99AB; OTR; tar1; TAR1; Tyr; TyR; TYR; Tyr-dro; Tyr-OctR; TyrR

String

7227.FBpp0078132 (http://string-db.org/newstring_cgi/show_network_section.pl?identifier= 7227.FBpp0078132)

Sequence Similarities

Belongs to the G-protein coupled receptor 1 family.

GO - Molecular Function

GO:0004930 : G protein-coupled receptor activity (https://www.ebi.ac.uk/QuickGO/term/GO:0004930)
GO:0008227 : G protein-coupled amine receptor activity (https://www.ebi.ac.uk/QuickGO/term/GO:0008227)

UniProtKB Drosophila melanogaster

P22270 (http://www.uniprot.org/uniprot/P22270)

GenebankID or UniProtKB

()

GO:0004989 : octopamine receptor activity (https://www.ebi.ac.uk/QuickGO/term/GO:0004989)

GO - Biological Process

GO:0007608 : sensory perception of smell (https://www.ebi.ac.uk/QuickGO/term/GO:0007608)
GO:0071880 : adenylate cyclase-activating adrenergic receptor signaling pathway (https://www.ebi.ac.uk/QuickGO/term/GO:0071880)
GO:0007211 : octopamine or tyramine signaling pathway (https://www.ebi.ac.uk/QuickGO/term/GO:0007211)
GO:1900738 : positive regulation of phospholipase C-activating G protein-coupled receptor signaling pathway (https://www.ebi.ac.uk/QuickGO/term/GO:1900738)
GO:0010578 : regulation of adenylate cyclase activity involved in G protein-coupled receptor signaling pathway (https://www.ebi.ac.uk/QuickGO/term/GO:0010578)

GO - Cellular Component

GO:0016021 : integral component of membrane (https://www.ebi.ac.uk/QuickGO/term/GO:0016021)
GO:0005886 : plasma membrane (https://www.ebi.ac.uk/QuickGO/term/GO:0005886)
GO:0005887 : integral component of plasma membrane (https://www.ebi.ac.uk/QuickGO/term/GO:0005887)

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

-

Molecular Details of the Mutation

L64I

Experimental Evidence

Association Mapping (https://www.gephebase.org/search-criteria?/and+Experimental Evidence=^Association Mapping^#gephebase-summary-title)

	Taxon A	Taxon B	Position
Codon	-	-	-
Amino-acid	Leu	Ile	64

Main Reference

Mutation in the RmÎ²AOR gene is associated with amitraz resistance in the cattle tick Rhipicephalus microplus. (2013) (https://pubmed.ncbi.nlm.nih.gov/24082133)

Authors

Corley SW; Jonsson NN; Piper EK; CutullÃ© C; Stear MJ; Seddon JM

Abstract

We aimed to describe the evolution of resistance to amitraz in Rhipicephalus microplus in the field and to test the association between amitraz resistance and the frequency of a mutation in the Î²-adrenergic octopamine receptor gene (RmÎ²AOR). We established six populations of Rhipicephalus microplus ticks in similar paddocks by the admixture of ticks from strains known to be susceptible and resistant to amitraz and synthetic pyrethroids. Each population was managed using one of three acaricide treatment regimes: always amitraz, always spinosad, or rotation between amitraz and spinosad. We used microsatellites to elucidate population structure over time, an SNP in the para-sodium channel gene previously demonstrated to confer resistance to synthetic pyrethroids to quantify changes in resistance to synthetic pyrethroids over time, and a nonsynonymous SNP in the RmÎ²AOR, a gene that we proposed to confer resistance to amitraz, to determine whether selection with amitraz increased the frequency of this mutation. The study showed panmixia of the two strains and that selection of ticks with amitraz increased the frequency of the RmÎ²AOR mutation while increasing the prevalence of amitraz-resistance. We conclude that polymorphisms in the RmÎ²AOR gene are likely to confer resistance to amitraz.

Additional References

Genotype to phenotype, the molecular and physiological dimensions of resistance in arthropods. (2015) (https://pubmed.ncbi.nlm.nih.gov/26047113)

RELATED GEPHE

Related Genes

2 (para (kdr), resistance to dieldrin) (https://www.gephebase.org/search-criteria?/or+Taxon ID=^6941^/and+Trait=Xenobiotic resistance/and+groupHaplotypes=true#gephebase-summary-title)

Related Haplotypes

No matches found.

EXTERNAL LINKS

COMMENTS