GEPHE SUMMARY

Gephebase Gene
GLC-1 (https://www.gephebase.org/search-criteria?/and+Gene Gephebase=^GLC-1^#gephebase-summary-title)

GepheID
GP00000400

Entry Status
Published

Main curator
Martin

PHENOTYPIC CHANGE

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

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

Trait State in Taxon A
C. elegans

Trait State in Taxon B
C. elegans

Ancestral State
Taxon A

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

Taxon A

Latin Name
Caenorhabditis elegans (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Caenorhabditis elegans^#gephebase-summary-title)

Common Name
-

Synonyms
roundworm; Rhabditis elegans; Caenorhabditis elegans (Maupas, 1900); Rhabditis elegans Maupas, 1900

Rank
species

Lineage
cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Protostomia; Ecdysozoa; Nematoda; Chromadorea; Rhabditida; Rhabditina; Rhabditomorpha; Rhabditoidea; Rhabditidae; Peloderinae; Caenorhabditis

Parent
Caenorhabditis () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 6237)

NCBI Taxonomy ID
6239 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 6239)

is Taxon A an Infraspecies?
No

Taxon B

Latin Name
Caenorhabditis elegans (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Caenorhabditis elegans^#gephebase-summary-title)

Common Name
-

Synonyms
roundworm; Rhabditis elegans; Caenorhabditis elegans (Maupas, 1900); Rhabditis elegans Maupas, 1900

Rank
species

Lineage
cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Protostomia; Ecdysozoa; Nematoda; Chromadorea; Rhabditida; Rhabditina; Rhabditomorpha; Rhabditoidea; Rhabditidae; Peloderinae; Caenorhabditis

Parent
Caenorhabditis () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 6237)

NCBI Taxonomy ID
6239 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 6239)

is Taxon B an Infraspecies?
No

GENOTYPIC CHANGE

Generic Gene Name
glc-1

Synonyms
F11A5.10

String
6239.F11A5.10 (http://string-db.org/newstring_cgi/show_network_section.pl?identifier= 6239.F11A5.10)

Sequence Similarities
Belongs to the ligand-gated ion channel (TC 1.A.9) family. Glutamate-gated chloride channel (TC 1.A.9.4) subfamily.

GO - Molecular Function
GO:0004888 : transmembrane signaling receptor activity (https://www.ebi.ac.uk/QuickGO/term/GO:0004888)
GO:0042802 : identical protein binding (https://www.ebi.ac.uk/QuickGO/term/GO:0042802)
GO:0005254 : chloride channel activity (https://www.ebi.ac.uk/QuickGO/term/GO:0005254)
GO:0008068 : extracellularly glutamate-gated chloride channel activity

UniProtKB Caenorhabditis elegans
G5EBR3 (http://www.uniprot.org/uniprot/G5EBR3)

GenebankID or UniProtKB
U14524 (https://www.ncbi.nlm.nih.gov/nuccore/U14524)

(https://www.ebi.ac.uk/QuickGO/term/GO:0008068)
GO:0016595 : glutamate binding (https://www.ebi.ac.uk/QuickGO/term/GO:0016595)

GO - Biological Process

GO:0007165 : signal transduction (https://www.ebi.ac.uk/QuickGO/term/GO:0007165)
GO:0007268 : chemical synaptic transmission
(https://www.ebi.ac.uk/QuickGO/term/GO:0007268)
GO:0051259 : protein complex oligomerization
(https://www.ebi.ac.uk/QuickGO/term/GO:0051259)
GO:0034220 : ion transmembrane transport
(https://www.ebi.ac.uk/QuickGO/term/GO:0034220)
GO:0050877 : nervous system process
(https://www.ebi.ac.uk/QuickGO/term/GO:0050877)
GO:0042391 : regulation of membrane potential
(https://www.ebi.ac.uk/QuickGO/term/GO:0042391)
GO:1902476 : chloride transmembrane transport
(https://www.ebi.ac.uk/QuickGO/term/GO:1902476)
GO:0031987 : locomotion involved in locomotory behavior
(https://www.ebi.ac.uk/QuickGO/term/GO:0031987)

GO - Cellular Component

GO:0005887 : integral component of plasma membrane
(https://www.ebi.ac.uk/QuickGO/term/GO:0005887)
GO:0030054 : cell junction (https://www.ebi.ac.uk/QuickGO/term/GO:0030054)
GO:0043005 : neuron projection (https://www.ebi.ac.uk/QuickGO/term/GO:0043005)
GO:0045211 : postsynaptic membrane
(https://www.ebi.ac.uk/QuickGO/term/GO:0045211)
GO:0045202 : synapse (https://www.ebi.ac.uk/QuickGO/term/GO:0045202)

Presumptive Null

Yes (https://www.gephebase.org/search-criteria?/and+Presumptive Null=^Yes^#gephebase-summary-title)

Molecular Type

Coding (https://www.gephebase.org/search-criteria?/and+Molecular Type=^Coding^#gephebase-summary-title)

Aberration Type

Deletion (https://www.gephebase.org/search-criteria?/and+Aberration Type=^Deletion^#gephebase-summary-title)

Deletion Size

10-99 bp

Molecular Details of the Mutation

4aa deletion

Experimental Evidence

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

Main Reference

Natural variation in a chloride channel subunit confers avermectin resistance in C. elegans. (2012) (https://pubmed.ncbi.nlm.nih.gov/22301316)

Authors

Ghosh R; Andersen EC; Shapiro JA; Gerke JP; Kruglyak L

Abstract

Resistance of nematodes to anthelmintics such as avermectins has emerged as a major global health and agricultural problem, but genes conferring natural resistance to avermectins are unknown. We show that a naturally occurring four-amino-acid deletion in the ligand-binding domain of GLC-1, the alpha-subunit of a glutamate-gated chloride channel, confers resistance to avermectins in the model nematode Caenorhabditis elegans. We also find that the same variant confers resistance to the avermectin-producing bacterium Streptomyces avermitilis. Population-genetic analyses identified two highly divergent haplotypes at the glc-1 locus that have been maintained at intermediate frequencies by long-term balancing selection. These results implicate variation in glutamate-gated chloride channels in avermectin resistance and provide a mechanism by which such resistance can be maintained.

Additional References

RELATED GEPHE

Related Genes

3 (acetyl-CoA carboxylase (ACC), beta-tubulin (ben-1), str-217) (https://www.gephebase.org/search-criteria?/or+Taxon ID=^6239^/and+Trait=Xenobiotic resistance/and+groupHaplotypes=true#gephebase-summary-title)

Related Haplotypes

No matches found.

EXTERNAL LINKS

COMMENTS

@BalancingSelection