GEPHE SUMMARY

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

GepheID
GP00000452

Entry Status
Published

Main curator
Martin

PHENOTYPIC CHANGE

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

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

Trait State in Taxon A
C. elegans - N2

Trait State in Taxon B
C.elegans wild strains

Ancestral State
Data not curated

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?
Yes

Taxon A Description
C. elegans - N2

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?
Yes

Taxon B Description
C.elegans wild strains

GENOTYPIC CHANGE

Generic Gene Name
hecw-1

Synonyms
F45H7.6

String
6239.F45H7.6 (http://string-db.org/newstring_cgi/show_network_section.pl?identifier= 6239.F45H7.6)

Sequence Similarities
-

GO - Molecular Function
GO:0061630 : ubiquitin protein ligase activity (https://www.ebi.ac.uk/QuickGO/term/GO:0061630)

GO - Biological Process
GO:0016567 : protein ubiquitination (https://www.ebi.ac.uk/QuickGO/term/GO:0016567)
GO:0006511 : ubiquitin-dependent protein catabolic process (https://www.ebi.ac.uk/QuickGO/term/GO:0006511)

UniProtKB Caenorhabditis elegans
G5EEJ0 (http://www.uniprot.org/uniprot/G5EEJ0)

GenebankID or UniProtKB
BX284603 (https://www.ncbi.nlm.nih.gov/nuccore/BX284603)

GO:0000209 : protein polyubiquitination
(https://www.ebi.ac.uk/QuickGO/term/GO:0000209)
GO:0048814 : regulation of dendrite morphogenesis
(https://www.ebi.ac.uk/QuickGO/term/GO:0048814)
GO:0045732 : positive regulation of protein catabolic process
(https://www.ebi.ac.uk/QuickGO/term/GO:0045732)
GO:2000650 : negative regulation of sodium ion transmembrane transporter activity
(https://www.ebi.ac.uk/QuickGO/term/GO:2000650)
GO:0043161 : proteasome-mediated ubiquitin-dependent protein catabolic process
(https://www.ebi.ac.uk/QuickGO/term/GO:0043161)
GO:1900424 : regulation of defense response to bacterium
(https://www.ebi.ac.uk/QuickGO/term/GO:1900424)

GO - Cellular Component

GO:0005737 : cytoplasm (https://www.ebi.ac.uk/QuickGO/term/GO:0005737)

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

Y322C

Experimental Evidence

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

	Taxon A	Taxon B	Position
Codon	-	-	-
Amino-acid	-	-	-

Main Reference

Natural polymorphisms in C. elegans HECW-1 E3 ligase affect pathogen avoidance behaviour. (2011) (https://pubmed.ncbi.nlm.nih.gov/22089131)

Authors

Chang HC; Paek J; Kim DH

Abstract

Heritable variation in behavioural traits generally has a complex genetic basis, and thus naturally occurring polymorphisms that influence behaviour have been defined only in rare instances. The isolation of wild strains of Caenorhabditis elegans has facilitated the study of natural genetic variation in this species and provided insights into its diverse microbial ecology. C. elegans responds to bacterial infection with conserved innate immune responses and, although lacking the immunological memory of vertebrate adaptive immunity, shows an aversive learning response to pathogenic bacteria. Here, we report the molecular characterization of naturally occurring coding polymorphisms in a C. elegans gene encoding a conserved HECT domain-containing E3 ubiquitin ligase, HECW-1. We show that two distinct polymorphisms in neighbouring residues of HECW-1 each affect C. elegans behavioural avoidance of a lawn of Pseudomonas aeruginosa. Neuron-specific rescue and ablation experiments and genetic interaction analysis indicate that HECW-1 functions in a pair of sensory neurons to inhibit P. aeruginosa lawn avoidance behaviour through inhibition of the neuropeptide receptor NPR-1 (ref. 10), which we have previously shown promotes P. aeruginosa lawn avoidance behaviour. Our data establish a molecular basis for natural variation in a C. elegans behaviour that may undergo adaptive changes in response to microbial pathogens.

Additional References

RELATED GEPHE

Related Genes

1 (npr-1) (https://www.gephebase.org/search-criteria?/or+Taxon ID=^6239^/and+Trait=Pathogen avoidance/and+groupHaplotypes=true#gephebase-summary-title)

Related Haplotypes

1 (https://www.gephebase.org/search-criteria?/or+Gene Gephebase=^HECW-1^/and+Taxon ID=^6239^/or+Gene Gephebase=^HECW-1^/and+Taxon ID=^6239^#gephebase-summary-title)

EXTERNAL LINKS

COMMENTS