GEPHE SUMMARY

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

GepheID
GP00002067

Entry Status
Published

Main curator
Courtier

PHENOTYPIC CHANGE

Trait #1

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

Trait
CO2 avoidance (https://www.gephebase.org/search-criteria?/and+Trait=^CO2 avoidance^#gephebase-summary-title)

Trait State in Taxon A
inhibited after exposure to high oxygen levels

Trait State in Taxon B
not inhibited after exposure to high oxygen levels

Trait #2

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

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

Trait State in Taxon A
does not suppress aggregation behavior of npr-1(null) animals

Trait State in Taxon B
suppress aggregation behavior of npr-1(null) animals

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?
Yes

Taxon B Description
French JU1249 strain

GENOTYPIC CHANGE

Generic Gene Name

CELE_F34D10.6

UniProtKB Caenorhabditis elegans

C6KRH4 (http://www.uniprot.org/uniprot/C6KRH4)

Synonyms

CELE_F34D10.6; F34D10.6

GenebankID or UniProtKB

()

String

6239.F34D10.6a
(http://string-db.org/newstring_cgi/show_network_section.pl?identifier= 6239.F34D10.6a)

Sequence Similarities

-

GO - Molecular Function

-

GO - Biological Process

-

GO - Cellular Component

-

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

1-9 bp

Molecular Details of the Mutation

8 bp deletion (mfP22) in the open reading frame

Experimental Evidence

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

Main Reference

Natural Variation in a Dendritic Scaffold Protein Remodels Experience-Dependent Plasticity by Altering Neuropeptide Expression. (2019) (https://pubmed.ncbi.nlm.nih.gov/31757604)

Authors

Beets I; Zhang G; Fenk LA; Chen C; Nelson GM; FÃ©lix MA; de Bono M

Abstract

The extent to which behavior is shaped by experience varies between individuals. Genetic differences contribute to this variation, but the neural mechanisms are not understood. Here, we dissect natural variation in the behavioral flexibility of two Caenorhabditis elegans wild strains. In one strain, a memory of exposure to 21% O suppresses CO-evoked locomotory arousal; in the other, CO evokes arousal regardless of previous O experience. We map thatÂ variation to a polymorphic dendritic scaffold protein, ARCP-1, expressed in sensory neurons. ARCP-1 binds the Ca-dependent phosphodiesterase PDE-1 and co-localizes PDE-1 with molecular sensors for CO at dendritic ends. Reducing ARCP-1 or PDE-1 activity promotes CO escape by altering neuropeptide expression in the BAG CO sensors. Variation in ARCP-1 alters behavioral plasticity in multiple paradigms. Our findings are reminiscent of genetic accommodation, an evolutionary process by which phenotypic flexibility in response to environmental variation is reset by genetic change.

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Additional References

RELATED GEPHE

Related Genes

3 (glb-5, exp-1, npr-1) (https://www.gephebase.org/search-criteria?/or+Taxon ID=^6239^/and+Trait=CO2 avoidance/or+Taxon ID=^6239^/and+Trait=Aggregation behavior/and+groupHaplotypes=true#gephebase-summary-title)

Related Haplotypes

No matches found.

EXTERNAL LINKS

COMMENTS