GEPHE SUMMARY

Gephebase Gene
nath-10 (https://www.gephebase.org/search-criteria?/and+Gene Gephebase=^nath-10^#gephebase-summary-title)

GepheID
GP00000718

Entry Status
Published

Main curator
Martin

PHENOTYPIC CHANGE

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

Trait
Fertility (sperm number; egg laying rate) (https://www.gephebase.org/search-criteria?/and+Trait=^Fertility (sperm number; egg laying rate)^#gephebase-summary-title)

Trait State in Taxon A
C. elegans

Trait State in Taxon B
C. elegans

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?
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
nath-10

Synonyms
F55A12.8

String
6239.F55A12.8 (http://string-db.org/newstring_cgi/show_network_section.pl?identifier= 6239.F55A12.8)

Sequence Similarities
Belongs to the RNA cytidine acetyltransferase family. NAT10 subfamily.

GO - Molecular Function
GO:0005524 : ATP binding (https://www.ebi.ac.uk/QuickGO/term/GO:0005524)
GO:1990883 : rRNA cytidine N-acetyltransferase activity (https://www.ebi.ac.uk/QuickGO/term/GO:1990883)

GO - Biological Process
GO:1904812 : rRNA acetylation involved in maturation of SSU-rRNA (https://www.ebi.ac.uk/QuickGO/term/GO:1904812)
GO:0051391 : tRNA acetylation (https://www.ebi.ac.uk/QuickGO/term/GO:0051391)

GO - Cellular Component

UniProtKB Caenorhabditis elegans
O01757 (http://www.uniprot.org/uniprot/O01757)

GenebankID or UniProtKB
FO080647 (https://www.ncbi.nlm.nih.gov/nuccore/FO080647)

GO:0005730 : nucleolus (https://www.ebi.ac.uk/QuickGO/term/GO:0005730)

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

Met746Ile (according to Table S2 C>T but it should be G>A - Needs curation)

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

Role of pleiotropy in the evolution of a cryptic developmental variation in Caenorhabditis elegans. (2012) (https://pubmed.ncbi.nlm.nih.gov/22235190)

Authors

Duveau F; FÃ©lix MA

Abstract

Robust biological systems are expected to accumulate cryptic genetic variation that does not affect the system output in standard conditions yet may play an evolutionary role once phenotypically expressed under a strong perturbation. Genetic variation that is cryptic relative to a robust trait may accumulate neutrally as it does not change the phenotype, yet it could also evolve under selection if it affects traits related to fitness in addition to its cryptic effect. Cryptic variation affecting the vulval intercellular signaling network was previously uncovered among wild isolates of Caenorhabditis elegans. Using a quantitative genetic approach, we identify a non-synonymous polymorphism of the previously uncharacterized nath-10 gene that affects the vulval phenotype when the system is sensitized with different mutations, but not in wild-type strains. nath-10 is an essential protein acetyltransferase gene and the homolog of human NAT10. The nath-10 polymorphism also presents non-cryptic effects on life history traits. The nath-10 allele carried by the N2 reference strain leads to a subtle increase in the egg laying rate and in the total number of sperm, a trait affecting the trade-off between fertility and minimal generation time in hermaphrodite individuals. We show that this allele appeared during early laboratory culture of N2, which allowed us to test whether it may have evolved under selection in this novel environment. The derived allele indeed strongly outcompetes the ancestral allele in laboratory conditions. In conclusion, we identified the molecular nature of a cryptic genetic variation and characterized its evolutionary history. These results show that cryptic genetic variation does not necessarily accumulate neutrally at the whole-organism level, but may evolve through selection for pleiotropic effects that alter fitness. In addition, cultivation in the laboratory has led to adaptive evolution of the reference strain N2 to the laboratory environment, which may modify other phenotypes of interest.

Additional References

RELATED GEPHE

Related Genes

4 (fog-2, tra-2, npr-1, nurf-1) (https://www.gephebase.org/search-criteria?/or+Taxon ID=^6239^/and+Trait=Fertility/and+groupHaplotypes=true#gephebase-summary-title)

Related Haplotypes

No matches found.

EXTERNAL LINKS

COMMENTS

@Pleiotropy