GEPHE SUMMARY

Gephebase Gene
fog-2 (https://www.gephebase.org/search-criteria?/and+Gene Gephebase=^fog-2^#gephebase-summary-title)

GepheID
GP00000349

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
Fertility (self-fertility; hermaphrodite spermatogenesis) (https://www.gephebase.org/search-criteria?/and+Trait=^Fertility (self-fertility; hermaphrodite spermatogenesis)^#gephebase-summary-title)

Trait State in Taxon A
Caenorhabditis briggsae

Trait State in Taxon B
Caenorhabditis elegans

Ancestral State
Data not curated

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

Taxon A

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

Common Name
-

Synonyms
Caenorhabditis briggsae Dougherty & Nigon, 1949

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
6238 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 6238)

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
fog-2

Synonyms
CELE_Y113G7B.5; Y113G7B.5

String
6239.Y113G7B.5b (http://string-db.org/newstring_cgi/show_network_section.pl?identifier= 6239.Y113G7B.5b)

Sequence Similarities
-

GO - Molecular Function
GO:0030371 : translation repressor activity (https://www.ebi.ac.uk/QuickGO/term/GO:0030371)

GO - Biological Process
GO:0007283 : spermatogenesis (https://www.ebi.ac.uk/QuickGO/term/GO:0007283)
GO:0017148 : negative regulation of translation (https://www.ebi.ac.uk/QuickGO/term/GO:0017148)
GO:0040021 : hermaphrodite germ-line sex determination

UniProtKB Caenorhabditis elegans
Q2YS43 (http://www.uniprot.org/uniprot/Q2YS43)

GenebankID or UniProtKB
BX284605 (https://www.ncbi.nlm.nih.gov/nuccore/BX284605)

(https://www.ebi.ac.uk/QuickGO/term/GO:0040021)
GO:1900195 : positive regulation of oocyte maturation
(https://www.ebi.ac.uk/QuickGO/term/GO:1900195)
GO:2000738 : positive regulation of stem cell differentiation
(https://www.ebi.ac.uk/QuickGO/term/GO:2000738)
GO:2000648 : positive regulation of stem cell proliferation
(https://www.ebi.ac.uk/QuickGO/term/GO:2000648)

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

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

Aberration Type

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

Molecular Details of the Mutation

Gene birth by duplication of an ancestral gene ; FOG-2 binds the translational regulator GLD-1 and promotes spermatogenesis ; see also tra-2 entry and associated references

Experimental Evidence

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

Main Reference

fog-2 and the evolution of self-fertile hermaphroditism in Caenorhabditis. (2005) (https://pubmed.ncbi.nlm.nih.gov/15630478)

Authors

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Abstract

Somatic and germline sex determination pathways have diverged significantly in animals, making comparisons between taxa difficult. To overcome this difficulty, we compared the genes in the germline sex determination pathways of Caenorhabditis elegans and C. briggsae, two Caenorhabditis species with similar reproductive systems and sequenced genomes. We demonstrate that C. briggsae has orthologs of all known C. elegans sex determination genes with one exception: fog-2. Hermaphroditic nematodes are essentially females that produce sperm early in life, which they use for self fertilization. In C. elegans, this brief period of spermatogenesis requires FOG-2 and the RNA-binding protein GLD-1, which together repress translation of the tra-2 mRNA. FOG-2 is part of a large C. elegans FOG-2-related protein family defined by the presence of an F-box and Duf38/FOG-2 homogy domain. A fog-2-related gene family is also present in C. briggsae, however, the branch containing fog-2 appears to have arisen relatively recently in C. elegans, post-speciation. The C-terminus of FOG-2 is rapidly evolving, is required for GLD-1 interaction, and is likely critical for the role of FOG-2 in sex determination. In addition, C. briggsae gld-1 appears to play the opposite role in sex determination (promoting the female fate) while maintaining conserved roles in meiotic progression during oogenesis. Our data indicate that the regulation of the hermaphrodite germline sex determination pathway at the level of FOG-2/GLD-1/tra-2 mRNA is fundamentally different between C. elegans and C. briggsae, providing functional evidence in support of the independent evolution of self-fertile hermaphroditism. We speculate on the convergent evolution of hermaphroditism in Caenorhabditis based on the plasticity of the C. elegans germline sex determination cascade, in which multiple mutant paths yield self fertility.

Additional References

RELATED GEPHE

Related Genes

1 (tra-2) (https://www.gephebase.org/search-criteria?/or+Taxon ID=^6238^/and+Trait=Fertility/or+Taxon ID=^6239^/and+Trait=Fertility/and+groupHaplotypes=true#gephebase-summary-title)

Related Haplotypes

No matches found.

EXTERNAL LINKS

COMMENTS