

GEPHE SUMMARY

fog-2 (#gephebase-summary-title)	Gephebase Gene	GP00000349	GephelD
	Entry Status	Martin	Main curator
Published			

PHENOTYPIC CHANGE

Physiology (#gephebase-summary-title)	Trait Category
Fertility (self-fertility; hermaphrodite spermatogenesis) (#gephebase-summary-title)	Trait
Caenorhabditis briggsae	Trait State in Taxon A
Caenorhabditis elegans	Trait State in Taxon B
Data not curated	Ancestral State
Interspecific (#gephebase-summary-title)	Taxonomic Status

Taxon A		Taxon B	
Caenorhabditis briggsae (#gephebase-summary-title))	Latin Name	Caenorhabditis elegans (#gephebase-summary-title))	Latin Name
-	Common Name	-	Common Name
Caenorhabditis briggsae Dougherty & Nigon, 1949	Synonyms	roundworm; Rhabditis elegans; Caenorhabditis elegans (Maupas, 1900); Rhabditis elegans Maupas, 1900	Synonyms
species	Rank	species	Rank
cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Protostomia; Ecdysozoa; Nematoda; Chromadorea; Rhabditida; Rhabditina; Rhabditomorpha; Rhabditoidea; Rhabditidae; Peloderinae; Caenorhabditis	Lineage	cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Protostomia; Ecdysozoa; Nematoda; Chromadorea; Rhabditida; Rhabditina; Rhabditomorpha; Rhabditoidea; Rhabditidae; Peloderinae; Caenorhabditis	Lineage
Caenorhabditis () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 6237)	Parent	Caenorhabditis () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 6237)	Parent
6238 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 6238)	NCBI Taxonomy ID	6239 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 6239)	NCBI Taxonomy ID
No	is Taxon A an Infraspecies?	No	is Taxon B an Infraspecies?

GENOTYPIC CHANGE

fog-2	Generic Gene Name	UniProtKB Caenorhabditis elegans
CELE_Y113G7B.5; Y113G7B.5	Synonyms	GenebankID or UniProtKB
6239.Y113G7B.5b (http://string-db.org/newstring_cgi/show_network_section.pl?identifier= 6239.Y113G7B.5b)	String	BX284605 (https://www.ncbi.nlm.nih.gov/nucore/BX284605)
-	Sequence Similarities	
GO:0030371 : translation repressor activity (https://www.ebi.ac.uk/QuickGO/term/GO:0030371)	GO - Molecular Function	
GO:0007283 : spermatogenesis (https://www.ebi.ac.uk/QuickGO/term/GO:0007283)	GO - Biological Process	
GO:0017148 : negative regulation of translation (https://www.ebi.ac.uk/QuickGO/term/GO:0017148)		
GO:0040021 : hermaphrodite germ-line sex determination		

(<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 homology 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