

GEPHE SUMMARY

	Gephebase Gene		GepheID
tra-3 calpain-like protease (https://www.gephebase.org/search-criteria?/and+Gene)		GP00001133	
Gephebase="tra-3 calpain-like protease"#gephebase-summary-title)			Main curator
	Entry Status	Martin	
Published			

PHENOTYPIC CHANGE

	Trait Category		
Physiology (https://www.gephebase.org/search-criteria?/and+Trait)			
Category="Physiology"#gephebase-summary-title)	Trait		
Body size (temperature-size interaction) (<a (temperature-size="" body="" href="https://www.gephebase.org/search-criteria?/and+Trait=" interaction)"#gephebase-summary-title"="" size="">https://www.gephebase.org/search-criteria?/and+Trait="Body size (temperature-size interaction)"#gephebase-summary-title)			
	Trait State in Taxon A		
C. elegans N2			
	Trait State in Taxon B		
C. elegans CB4856			
	Ancestral State		
Data not curated			
	Taxonomic Status		
Intraspecific (https://www.gephebase.org/search-criteria?/and+Taxonomic)			
Status="Intraspecific"#gephebase-summary-title)			
	Taxon A		Taxon B
	Latin Name		Latin Name
Caenorhabditis elegans		Caenorhabditis elegans	
(https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms="Caenorhabditis elegans"#gephebase-summary-title)		(https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms="Caenorhabditis elegans"#gephebase-summary-title)	
	Common Name		Common Name
-		-	
	Synonyms		Synonyms
roundworm; Rhabditis elegans; Caenorhabditis elegans (Maupas, 1900); Rhabditis elegans Maupas, 1900		roundworm; Rhabditis elegans; Caenorhabditis elegans (Maupas, 1900); Rhabditis elegans Maupas, 1900	
	Rank		Rank
species		species	
	Lineage		Lineage
cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Protostomia; Ecdysozoa; Nematoda; Chromadorea; Rhabditida; Rhabditina; Rhabditomorpha; Rhabditoidea; Rhabditidae; Peloderinae; Caenorhabditis		cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Protostomia; Ecdysozoa; Nematoda; Chromadorea; Rhabditida; Rhabditina; Rhabditomorpha; Rhabditoidea; Rhabditidae; Peloderinae; Caenorhabditis	
	Parent		Parent
Caenorhabditis () - (Rank: genus)		Caenorhabditis () - (Rank: genus)	
(https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 6237)		(https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 6237)	
	NCBI Taxonomy ID		NCBI Taxonomy ID
6239		6239	
(https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 6239)		(https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 6239)	
	is Taxon A an Intraspecies?		is Taxon B an Intraspecies?
Yes		Yes	
	Taxon A Description		Taxon B Description
C. elegans N2		C. elegans CB4856	

GENOTYPIC CHANGE

	Generic Gene Name		UniProtKB Caenorhabditis elegans
tra-3		Q22036 (http://www.uniprot.org/uniprot/Q22036)	
	Synonyms		GenebankID or UniProtKB
clp-5; LLC1.1		U12921 (https://www.ncbi.nlm.nih.gov/nuccore/U12921)	
	String		
6239.LLC1.1			
(http://string-db.org/newstring.cgi/show_network_section.pl?identifier= 6239.LLC1.1)			
	Sequence Similarities		
Belongs to the peptidase C2 family.			
	GO - Molecular Function		
GO:0004197 : cysteine-type endopeptidase activity			
(https://www.ebi.ac.uk/QuickGO/term/GO:0004197)			
GO:0004198 : calcium-dependent cysteine-type endopeptidase activity			
(https://www.ebi.ac.uk/QuickGO/term/GO:0004198)			
	GO - Biological Process		
GO:0030154 : cell differentiation (https://www.ebi.ac.uk/QuickGO/term/GO:0030154)			

GO:0006508 : proteolysis (<https://www.ebi.ac.uk/QuickGO/term/GO:0006508>)
GO:0007548 : sex differentiation (<https://www.ebi.ac.uk/QuickGO/term/GO:0007548>)
GO:0019099 : female germ-line sex determination (<https://www.ebi.ac.uk/QuickGO/term/GO:0019099>)
GO:0042001 : hermaphrodite somatic sex determination (<https://www.ebi.ac.uk/QuickGO/term/GO:0042001>)
GO:0042004 : feminization of hermaphrodite soma (<https://www.ebi.ac.uk/QuickGO/term/GO:0042004>)
GO:0031293 : membrane protein intracellular domain proteolysis (<https://www.ebi.ac.uk/QuickGO/term/GO:0031293>)
GO:0016540 : protein autoprocessing (<https://www.ebi.ac.uk/QuickGO/term/GO:0016540>)

GO - Cellular Component

GO:0005737 : cytoplasm (<https://www.ebi.ac.uk/QuickGO/term/GO:0005737>)
GO:0016020 : membrane (<https://www.ebi.ac.uk/QuickGO/term/GO:0016020>)

Presumptive Null

No ([https://www.gephebase.org/search-criteria?/and+Presumptive Null="+No`#gephebase-summary-title](https://www.gephebase.org/search-criteria?/and+Presumptive Null=))

Molecular Type

Coding ([https://www.gephebase.org/search-criteria?/and+Molecular Type="+Coding`#gephebase-summary-title](https://www.gephebase.org/search-criteria?/and+Molecular Type=))

Aberration Type

SNP ([https://www.gephebase.org/search-criteria?/and+Aberration Type="+SNP`#gephebase-summary-title](https://www.gephebase.org/search-criteria?/and+Aberration Type=))

SNP Coding Change

Nonsynonymous

Molecular Details of the Mutation

F96L

Experimental Evidence

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

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

Main Reference

A *Caenorhabditis elegans* wild type defies the temperature-size rule owing to a single nucleotide polymorphism in *tra-3*. (2007) (<https://pubmed.ncbi.nlm.nih.gov/17335351>)

Authors

Kammenga JE; Doroszuk A; Riksen JA; Hazendonk E; Spiridon L; Petrescu AJ; Tijsterman M; Plasterk RH; Bakker J

Abstract

Ecotherms rely for their body heat on surrounding temperatures. A key question in biology is why most ectotherms mature at a larger size at lower temperatures, a phenomenon known as the temperature-size rule. Since temperature affects virtually all processes in a living organism, current theories to explain this phenomenon are diverse and complex and assert often from opposing assumptions. Although widely studied, the molecular genetic control of the temperature-size rule is unknown. We found that the *Caenorhabditis elegans* wild-type N2 complied with the temperature-size rule, whereas wild-type CB4856 defied it. Using a candidate gene approach based on an N2 x CB4856 recombinant inbred panel in combination with mutant analysis, complementation, and transgenic studies, we show that a single nucleotide polymorphism in *tra-3* leads to mutation F96L in the encoded calpain-like protease. This mutation attenuates the ability of CB4856 to grow larger at low temperature. Homology modelling predicts that F96L reduces TRA-3 activity by destabilizing the DII-A domain. The data show that size adaptation of ectotherms to temperature changes may be less complex than previously thought because a subtle wild-type polymorphism modulates the temperature responsiveness of body size. These findings provide a novel step toward the molecular understanding of the temperature-size rule, which has puzzled biologists for decades.

Additional References

RELATED GEPHE

Related Genes

No matches found.

Related Haplotypes

No matches found.

EXTERNAL LINKS

COMMENTS

