

GEPHE SUMMARY

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

PHENOTYPIC CHANGE

	Trait Category	
Physiology (https://www.gephebase.org/search-criteria?/and+Trait Category=^Physiology^#gephebase-summary-title)	Trait	
Body size (temperature-size interaction) (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 (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
species	Rank	Rank
	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) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 6237)	NCBI Taxonomy ID	NCBI Taxonomy ID
6239 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 6239)		
Yes	is Taxon A an Infraspecies?	is Taxon B an Infraspecies?
C. elegans N2	Taxon A Description	Taxon B Description
	C. elegans CB4856	

GENOTYPIC CHANGE

tra-3	Generic Gene Name	UniProtKB Caenorhabditis elegans
clp-5; LLC1.1	Synonyms	GenebankID or UniProtKB
6239.LLC1.1 (http://string-db.org/newstring_cgi/show_network_section.pl?identifier= 6239.LLC1.1)	String	
Belongs to the peptidase C2 family.	Sequence Similarities	
GO:0004197 : cysteine-type endopeptidase activity (https://www.ebi.ac.uk/QuickGO/term/GO:0004197)	GO - Molecular Function	
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>)

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

F96L

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

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

Ectotherms 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.	
No matches found.	Related Haplotypes

EXTERNAL LINKS

COMMENTS

