

GEPHE SUMMARY

	Gephebase Gene	GephelD
sterol C5 desaturase (https://www.gephebase.org/search-criteria/?and+Gene Gephebase="sterol C5 desaturase">#gephebase-summary-title)	GP00001954	Main curator
Published	Entry Status	Courtier

PHENOTYPIC CHANGE

	Trait Category
Physiology (https://www.gephebase.org/search-criteria/?and+Trait Category="Physiology">#gephebase-summary-title)	Trait
Cholesterol metabolism (cholesterol biosynthesis) (https://www.gephebase.org/search-criteria/?and+Trait=^Cholesterol+metabolism+(cholesterol+biosynthesis)^#gephebase-summary-title)	Trait State in Taxon A
able to synthesise cholesterol de novo	Trait State in Taxon B
unable to synthesise cholesterol de novo	Ancestral State
Taxon A	Taxonomic Status
Intergeneric or Higher (https://www.gephebase.org/search-criteria/?and+Taxonomic Status="Intergeneric or Higher">#gephebase-summary-title)	

Taxon A	Latin Name	Taxon B	Latin Name
Homo sapiens (#gephebase-summary-title)		Caenorhabditis elegans (#gephebase-summary-title)	
human	Common Name	-	Common Name
human; man; Homo sapiens Linnaeus, 1758; Homo sapiens; Homo sapiens	Synonyms	roundworm; Rhabditis elegans; Caenorhabditis elegans (Maupas, 1900); Rhabditis elegans Maupas, 1900	Synonyms
species	Rank	species	Rank
cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Deuterostomia; Chordata; Craniata; Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Sarcopterygii; Dipnotetrapodomorpha; Tetrapoda; Amniota; Mammalia; Theria; Eutheria; Boreoeutheria; Euchortoglires; Primates; Haplorrhini; Simiiformes; Catarrhini; Hominoidea; Hominidae; Homininae; Homo	Lineage	cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Protostomia; Ecdysozoa; Nematoda; Chromadorea; Rhabditida; Rhabditina; Rhabditomorpha; Rhabditoidea; Rhabditidae; Peloderinae; Caenorhabditis	Lineage
Homo () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 9605)	Parent	Caenorhabditis () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 6237)	Parent
9606 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 9606)	NCBI Taxonomy ID	6239 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 6239)	NCBI Taxonomy ID
No			is Taxon B an Infraspecies?
	is Taxon A an Infraspecies?	No	

GENOTYPIC CHANGE

ERG3	Generic Gene Name	UniProtKB Saccharomyces cerevisiae (strain ATCC 204508 / S288c) P32353 (http://www.uniprot.org/uniprot/P32353)
PSO6; SYR1; YLR056W; L2150	Synonyms	GenebankID or UniProtKB
4932.YLR056W (http://string-db.org/newstring_cgi/show_network_section.pl?identifier= 4932.YLR056W)	String	0
Belongs to the sterol desaturase family.	Sequence Similarities	
GO:0005506 : iron ion binding (https://www.ebi.ac.uk/QuickGO/term/GO:0005506) GO:0000248 : C-5 sterol desaturase activity (https://www.ebi.ac.uk/QuickGO/term/GO:0000248)	GO - Molecular Function GO - Biological Process	

GO:0006696 : ergosterol biosynthetic process
(<https://www.ebi.ac.uk/QuickGO/term/GO:0006696>)
GO:0016126 : sterol biosynthetic process
(<https://www.ebi.ac.uk/QuickGO/term/GO:0016126>)

GO - Cellular Component

GO:0016021 : integral component of membrane
(<https://www.ebi.ac.uk/QuickGO/term/GO:0016021>)
GO:0005788 : endoplasmic reticulum lumen
(<https://www.ebi.ac.uk/QuickGO/term/GO:0005788>)
GO:0005789 : endoplasmic reticulum membrane
(<https://www.ebi.ac.uk/QuickGO/term/GO:0005789>)

Yes ([#gephebase-summary-title](https://www.gephebase.org/search-criteria?/and+Presumptive Null=^Yes))

Presumptive Null

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

Molecular Type

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

Aberration Type

unknown

Molecular Details of the Mutation

gene absent in the genome

Experimental Evidence

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

Main Reference

Preservation of genes involved in sterol metabolism in cholesterol auxotrophs: facts and hypotheses. (2008) (<https://pubmed.ncbi.nlm.nih.gov/18682733>)

Authors

Vinci G; Xia X; Veitia RA

Abstract

It is known that primary sequences of enzymes involved in sterol biosynthesis are well conserved in organisms that produce sterols de novo. However, we provide evidence for a preservation of the corresponding genes in two animals unable to synthesize cholesterol (auxotrophs): *Drosophila melanogaster* and *Caenorhabditis elegans*.

We have been able to detect bona fide orthologs of several ERG genes in both organisms using a series of complementary approaches. We have detected strong sequence divergence between the orthologs of the nematode and of the fruitfly; they are also very divergent with respect to the orthologs in organisms able to synthesize sterols de novo (prototrophs). Interestingly, the orthologs in both the nematode and the fruitfly are still under selective pressure. It is possible that these genes, which are not involved in cholesterol synthesis anymore, have been recruited to perform different new functions. We propose a more parsimonious way to explain their accelerated evolution and subsequent stabilization. The products of ERG genes in prototrophs might be involved in several biological roles, in addition to sterol synthesis. In the case of the nematode and the fruitfly, the relevant genes would have lost their ancestral function in cholesterolgenesis but would have retained the other function(s), which keep them under pressure.

By exploiting microarray data we have noticed a strong expressional correlation between the orthologs of ERG24 and ERG25 in *D. melanogaster* and genes encoding factors involved in intracellular protein trafficking and folding and with Start1 involved in ecdysteroid synthesis. These potential functional connections are worth being explored not only in *Drosophila*, but also in *Caenorhabditis* as well as in sterol prototrophs.

Additional References

RELATED GEPHE

3 (lanosterol c14 demethylase, lanosterol synthase, squalene synthase) ([#gephebase-summary-title](https://www.gephebase.org/search-criteria?/or+Taxon ID=^9606#/and+Trait=Cholesterol metabolism/or+Taxon ID=^6239#/and+Trait=Cholesterol metabolism/and+groupHaplotypes=true))

Related Genes

1 ([#gephebase-summary-title](https://www.gephebase.org/search-criteria?/or+Gene Gephebase=^sterol C5 desaturase#/and+Taxon ID=^9606#/or+Gene Gephebase=^sterol C5 desaturase#/and+Taxon ID=^6239))

Related Haplotypes

EXTERNAL LINKS

COMMENTS

@ParrallelEvolution in insects