

# GEPHE SUMMARY

	Gephebase Gene	GephelD
SPR ( <a href="https://www.gephebase.org/search-criteria?/and+Gene">https://www.gephebase.org/search-criteria?/and+Gene</a> Gephebase=^SPR^#gephebase-summary-title)	GP00002119	Main curator
Published	Entry Status	Santos

## PHENOTYPIC CHANGE

	Trait Category		
Morphology ( <a href="https://www.gephebase.org/search-criteria?/and+Trait">https://www.gephebase.org/search-criteria?/and+Trait</a> Category=^Morphology^#gephebase-summary-title)	Trait		
Coloration (ventral scales) ( <a href="https://www.gephebase.org/search-criteria?/and+Trait=^Coloration+(ventral+scales)^#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Trait=^Coloration+(ventral+scales)^#gephebase-summary-title</a> )	Trait State in Taxon A		
Presence of ventral orange pigmentation	Trait State in Taxon B		
Absence of orange: individuals have either yellow or mosaic pigmentation (a mixture of orange and white)	Ancestral State		
Unknown	Taxonomic Status		
Intraspecific ( <a href="https://www.gephebase.org/search-criteria?/and+Taxonomic">https://www.gephebase.org/search-criteria?/and+Taxonomic</a> Status=^Intraspecific^#gephebase-summary-title)			
Taxon A		Taxon B	
Podarcis muralis ( <a href="https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=^Podarcis+muralis^#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=^Podarcismuralis^#gephebase-summary-title</a> )	Latin Name	Podarcis muralis ( <a href="https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=^Podarcis+muralis^#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=^Podarcismuralis^#gephebase-summary-title</a> )	Latin Name
Common wall lizard	Common Name	Common wall lizard	Common Name
Lacerta muralis; Common wall lizard; Mauereidechse; Lacerta muralis Dumeril & Bibron, 1893; Podarcis muralis (Dumeril & Bibron, 1839)	Synonyms	Lacerta muralis; Common wall lizard; Mauereidechse; Lacerta muralis Dumeril & Bibron, 1893; Podarcis muralis (Dumeril & Bibron, 1839)	Synonyms
species	Rank	species	Rank
cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Deuterostomia; Chordata; Craniata; Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Sarcopterygii; Dipnotetrapodomorpha; Tetrapoda; Amniota; Sauropsida; Sauria; Lepidosauria; Squamata; Bifurcata; Unidentata; Episquamata; Laterata; Lacertidae; Lacertinae; Podarcis	Lineage	cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Deuterostomia; Chordata; Craniata; Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Sarcopterygii; Dipnotetrapodomorpha; Tetrapoda; Amniota; Sauropsida; Sauria; Lepidosauria; Squamata; Bifurcata; Unidentata; Episquamata; Laterata; Lacertidae; Lacertinae; Podarcis	Lineage
Podarcis () - (Rank: genus) ( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=42163">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=42163</a> )	Parent	Podarcis () - (Rank: genus) ( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=42163">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=42163</a> )	Parent
64176 ( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=64176">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=64176</a> )	NCBI Taxonomy ID	64176 ( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=64176">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=64176</a> )	NCBI Taxonomy ID
No	is Taxon A an Infraspecies?	No	is Taxon B an Infraspecies?

## GENOTYPIC CHANGE

Spr	Generic Gene Name	UniProtKB Mus musculus
-	Synonyms	GenebankID or UniProtKB
10090.ENSMUSP00000048111 ( <a href="http://string-db.org/newstring_cgi/show_network_section.pl?identifier=10090.ENSMUSP00000048111">http://string-db.org/newstring_cgi/show_network_section.pl?identifier=10090.ENSMUSP00000048111</a> )	String	114604456 ( <a href="https://www.ncbi.nlm.nih.gov/nuccore/114604456">https://www.ncbi.nlm.nih.gov/nuccore/114604456</a> )
Belongs to the sepiapterin reductase family.	Sequence Similarities	
GO:0042803 : protein homodimerization activity ( <a href="https://www.ebi.ac.uk/QuickGO/term/GO:0042803">https://www.ebi.ac.uk/QuickGO/term/GO:0042803</a> )	GO - Molecular Function	
GO:0004757 : sepiapterin reductase activity ( <a href="https://www.ebi.ac.uk/QuickGO/term/GO:0004757">https://www.ebi.ac.uk/QuickGO/term/GO:0004757</a> )		
		GO - Biological Process

GO:0010033 : response to organic substance  
(<https://www.ebi.ac.uk/QuickGO/term/GO:0010033>)  
GO:0042417 : dopamine metabolic process  
(<https://www.ebi.ac.uk/QuickGO/term/GO:0042417>)  
GO:0040014 : regulation of multicellular organism growth  
(<https://www.ebi.ac.uk/QuickGO/term/GO:0040014>)  
GO:0042415 : norepinephrine metabolic process  
(<https://www.ebi.ac.uk/QuickGO/term/GO:0042415>)  
GO:0006729 : tetrahydrobiopterin biosynthetic process  
(<https://www.ebi.ac.uk/QuickGO/term/GO:0006729>)  
GO:0048667 : cell morphogenesis involved in neuron differentiation  
(<https://www.ebi.ac.uk/QuickGO/term/GO:0048667>)  
GO:0006558 : L-phenylalanine metabolic process  
(<https://www.ebi.ac.uk/QuickGO/term/GO:0006558>)  
GO:0006809 : nitric oxide biosynthetic process  
(<https://www.ebi.ac.uk/QuickGO/term/GO:0006809>)  
GO:0019889 : pteridine metabolic process  
(<https://www.ebi.ac.uk/QuickGO/term/GO:0019889>)  
GO:0042428 : serotonin metabolic process  
(<https://www.ebi.ac.uk/QuickGO/term/GO:0042428>)  
GO:0046146 : tetrahydrobiopterin metabolic process  
(<https://www.ebi.ac.uk/QuickGO/term/GO:0046146>)  
GO:0050882 : voluntary musculoskeletal movement  
(<https://www.ebi.ac.uk/QuickGO/term/GO:0050882>)

#### GO - Cellular Component

GO:0005829 : cytosol (<https://www.ebi.ac.uk/QuickGO/term/GO:0005829>)  
GO:0005654 : nucleoplasm (<https://www.ebi.ac.uk/QuickGO/term/GO:0005654>)  
GO:0005739 : mitochondrion (<https://www.ebi.ac.uk/QuickGO/term/GO:0005739>)

Presumptive Null

No (<https://www.gephebase.org/search-criteria/?and+Presumptive+Null=%22No%22#gephebase-summary-title>)

Molecular Type

Cis-regulatory (<https://www.gephebase.org/search-criteria/?and+Molecular+Type=%22Cis-regulatory%22#gephebase-summary-title>)

Aberration Type

Unknown (<https://www.gephebase.org/search-criteria/?and+Aberration+Type=%22Unknown%22#gephebase-summary-title>)

Molecular Details of the Mutation

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Experimental Evidence

Association Mapping (<https://www.gephebase.org/search-criteria/?and+Experimental+Evidence=%22Association+Mapping%22#gephebase-summary-title>)

Main Reference

Regulatory changes in pterin and carotenoid genes underlie balanced color polymorphisms in the wall lizard. (2019) (<https://pubmed.ncbi.nlm.nih.gov/30819892>)

Authors

Andrade P; Pinho C; PÃ©rez I de Lanuza G; Afonso S; Brejcha J; Rubin CJ; Wallerman O; Pereira P; Sabatino SJ; Bellati A; Pellitteri-Rosa D; Bosakova Z; Bunikis I; Carretero MA; Feiner N; Marsik P; PaupÃ©rio F; Salvi D; Soler L; While GM; Uller T; Font E; Andersson L; Carneiro M

Abstract

Reptiles use pterin and carotenoid pigments to produce yellow, orange, and red colors. These conspicuous colors serve a diversity of signaling functions, but their molecular basis remains unresolved. Here, we show that the genomes of sympatric color morphs of the European common wall lizard (*Podarcis muralis*), which differ in orange and yellow pigmentation and in their ecology and behavior, are virtually undifferentiated. Genetic differences are restricted to two small regulatory regions near genes associated with pterin [sepiapterin reductase (SPR)] and carotenoid [ $\beta$ -carotene oxygenase 2 (BCO2)] metabolism, demonstrating that a core gene in the housekeeping pathway of pterin biosynthesis has been coopted for bright coloration in reptiles and indicating that these loci exert pleiotropic effects on other aspects of physiology. Pigmentation differences are explained by extremely divergent alleles, and haplotype analysis revealed abundant transspecific allele sharing with other lacertids exhibiting color polymorphisms. The evolution of these conspicuous color ornaments is the result of ancient genetic variation and cross-species hybridization.

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Additional References

## RELATED GEPHE

1 (BCO2 = beta-carotene oxygenase 2) (<https://www.gephebase.org/search-criteria/?or+Taxon+ID=%2264176%22+and+Trait=Coloration+and+groupHaplotypes=true#gephebase-summary-title>)

Related Genes

No matches found.

Related Haplotypes

## EXTERNAL LINKS

## COMMENTS

