

GEPHE SUMMARY

	Gephebase Gene	GephelD
arginyl-transfer RNA synthetase (RARS) (https://www.gephebase.org/search-criteria?/and+Gene Gephebase=^arginyl-transfer RNA synthetase (RARS)^#gephebase-summary-title)	GP00002620	
	Entry Status	Main curator
Published	Courtier	

PHENOTYPIC CHANGE

	Trait Category		
Physiology (https://www.gephebase.org/search-criteria?/and+Trait Category=^Physiology^#gephebase-summary-title)	Trait		
Heat tolerance (https://www.gephebase.org/search-criteria?/and+Trait=^Heat tolerance^#gephebase-summary-title)	Trait State in Taxon A		
Anolis cristatellus - forest and lower heat tolerance	Trait State in Taxon B		
Anolis cristatellus - urban and higher heat tolerance	Ancestral State		
Taxon A	Taxonomic Status		
Intraspecific (https://www.gephebase.org/search-criteria?/and+Taxonomic Status=^Intraspecific^#gephebase-summary-title)			
Taxon A	Latin Name	Taxon B	Latin Name
Anolis cristatellus (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Anolis cristatellus^#gephebase-summary-title)		Anolis cristatellus (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Anolis cristatellus^#gephebase-summary-title)	
-	Common Name	-	Common Name
Ctenonotus cristatellus; Anolis cristatellus Duméril & Bibron, 1837; MCZ 8306; MCZ:8306	Synonyms	Ctenonotus cristatellus; Anolis cristatellus Duméril & Bibron, 1837; MCZ 8306; MCZ:8306	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; Toxicofera; Iguania; Dactyloidae; Anolis	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; Toxicofera; Iguania; Dactyloidae; Anolis	Lineage
Anolis () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 28376)	Parent	Anolis () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 28376)	Parent
38889 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 38889)	NCBI Taxonomy ID	38889 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 38889)	NCBI Taxonomy ID
No	is Taxon A an Infraspecies?	No	is Taxon B an Infraspecies?

GENOTYPIC CHANGE

	Generic Gene Name		
RARS2			UniProtKB Homo sapiens
PCH6; ArgRS; RARSL; DALRD2; PRO1992	Synonyms		GenebankID or UniProtKB
9606.ENSP00000358549 (http://string-db.org/newstring_cgi/show_network_section.pl?identifier=9606.ENSP00000358549)	String	0	
	Sequence Similarities		
Belongs to the class-I aminoacyl-tRNA synthetase family.			
GO:0005524 : ATP binding (https://www.ebi.ac.uk/QuickGO/term/GO:0005524)	GO - Molecular Function		
GO:0003723 : RNA binding (https://www.ebi.ac.uk/QuickGO/term/GO:0003723)			
GO:0004814 : arginine-tRNA ligase activity (https://www.ebi.ac.uk/QuickGO/term/GO:0004814)		GO - Biological Process	
GO:0032543 : mitochondrial translation			

(<https://www.ebi.ac.uk/QuickGO/term/GO:0032543>)
 GO:0006420 : arginyl-tRNA aminoacylation
 (<https://www.ebi.ac.uk/QuickGO/term/GO:0006420>)
 GO:0006418 : tRNA aminoacylation for protein translation
 (<https://www.ebi.ac.uk/QuickGO/term/GO:0006418>)

GO - Cellular Component

GO:0005739 : mitochondrion (<https://www.ebi.ac.uk/QuickGO/term/GO:0005739>)
 GO:0005759 : mitochondrial matrix (<https://www.ebi.ac.uk/QuickGO/term/GO:0005759>)

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

C>G threonine>serine at amino acid residue 558 of the RARS gene = adjacent to a predicted protein-binding region22 (AA556–557). There are four non-synonymous polymorphic sites within RARS. Only one shows a significant difference in allele frequency between forest and urban habitats across all populations.

Experimental Evidence

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

	Taxon A	Taxon B	Position
Codon	ACN	AGN	-
Amino-acid	Thr	Ser	558

Main Reference

Parallel selection on thermal physiology facilitates repeated adaptation of city lizards to urban heat islands. (2020) (<https://pubmed.ncbi.nlm.nih.gov/32152530>)

Authors

Campbell-Staton SC; Winchell KM; Rochette NC; Fredette J; Maayan I; Schweizer RM; Catchen J

Abstract

Only recently have we begun to understand the ecological and evolutionary effects of urbanization on species, with studies revealing drastic impacts on community composition, gene flow, behaviour, morphology and physiology. However, our understanding of how adaptive evolution allows species to persist, and even thrive, in urban landscapes is still nascent. Here, we examine phenotypic, genomic and regulatory impacts of urbanization on a widespread lizard, the Puerto Rican crested anole (*Anolis cristatellus*). We find that urban lizards endure higher environmental temperatures and display greater heat tolerance than their forest counterparts. A single non-synonymous polymorphism within a protein synthesis gene (RARS) is associated with heat tolerance plasticity within urban heat islands and displays parallel signatures of selection in cities. Additionally, we identify groups of differentially expressed genes between habitats showing elevated genetic divergence in multiple urban-forest comparisons. These genes display evidence of adaptive regulatory evolution within cities and disproportionately cluster within regulatory modules associated with heat tolerance. This study provides evidence of temperature-mediated selection in urban heat islands with repeatable impacts on physiological evolution at multiple levels of biological hierarchy.

Additional References

RELATED GEPHE

Related Genes

No matches found.

Related Haplotypes

No matches found.

EXTERNAL LINKS

COMMENTS