GEPHE SUMMARY

Gephebase Gene
Oca2 (https://www.gephebase.org/search-criteria?/and+Gene Gephebase=^Oca2^#gephebase-summary-title)

GepheID
GP00002352

Entry Status
Published

Main curator
Courtier

PHENOTYPIC CHANGE

Trait Category
Morphology (https://www.gephebase.org/search-criteria?/and+Trait Category=^Morphology^#gephebase-summary-title)

Trait
Coloration (albinism) (https://www.gephebase.org/search-criteria?/and+Trait=^Coloration (albinism)^#gephebase-summary-title)

Trait State in Taxon A
wild-type coloration

Trait State in Taxon B
absence of all black and brown pigmentation in the skin; iris and retina

Ancestral State
Taxon A

Taxonomic Status
Domesticated (https://www.gephebase.org/search-criteria?/and+Taxonomic Status=^Domesticated^#gephebase-summary-title)

Taxon A

Latin Name
Carassius auratus (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Carassius auratus^#gephebase-summary-title)

Common Name
goldfish

Synonyms
Carassius carassius auratus; Cyprinus auratus; goldfish; Carassius auratus (Linnaeus, 1758); Cyprinus auratus Linnaeus, 1758; Carassius auratis

Rank
species

Lineage
cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Deuterostomia; Chordata; Craniata; Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Otomorpha; Ostariophysi; Otophysi; Cypriniphysae; Cypriniformes; Cyprinoidei; Cyprinidae; Cyprininae; Carassius

Parent
Carassius () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 7956)

NCBI Taxonomy ID
7957 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 7957)

is Taxon A an Infraspecies?
No

Taxon B

Latin Name
Carassius auratus (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Carassius auratus^#gephebase-summary-title)

Common Name
goldfish

Synonyms
Carassius carassius auratus; Cyprinus auratus; goldfish; Carassius auratus (Linnaeus, 1758); Cyprinus auratus Linnaeus, 1758; Carassius auratis

Rank
species

Lineage
cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Deuterostomia; Chordata; Craniata; Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupeocephala; Otomorpha; Ostariophysi; Otophysi; Cypriniphysae; Cypriniformes; Cyprinoidei; Cyprinidae; Cyprininae; Carassius

Parent
Carassius () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 7956)

NCBI Taxonomy ID
7957 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 7957)

is Taxon B an Infraspecies?
No

GENOTYPIC CHANGE

Generic Gene Name
Oca2

Synonyms
p; D7Nic1; p<cas>; D7H15S12; D7Icr28RN; P

String
10090.ENSMUSP00000032633 (http://string-db.org/newstring_cgi/show_network_section.pl?identifier=10090.ENSMUSP00000032633)

Sequence Similarities
Belongs to the CitM (TC 2.A.11) transporter family.

GO - Molecular Function
-

GO - Biological Process
GO:0055085 : transmembrane transport (https://www.ebi.ac.uk/QuickGO/term/GO:0055085)
GO:0042438 : melanin biosynthetic process

UniProtKB Mus musculus
Q62052 (http://www.uniprot.org/uniprot/Q62052)

GenebankID or UniProtKB Mus musculus
Q62052 (https://www.ncbi.nlm.nih.gov/nuccore/Q62052)

(https://www.ebi.ac.uk/QuickGO/term/GO:0042438)
GO:0043473 : pigmentation (https://www.ebi.ac.uk/QuickGO/term/GO:0043473)
GO:0008283 : cell proliferation (https://www.ebi.ac.uk/QuickGO/term/GO:0008283)
GO:0048066 : developmental pigmentation
(https://www.ebi.ac.uk/QuickGO/term/GO:0048066)
GO:0030318 : melanocyte differentiation
(https://www.ebi.ac.uk/QuickGO/term/GO:0030318)
GO:0007286 : spermatid development
(https://www.ebi.ac.uk/QuickGO/term/GO:0007286)

GO - Cellular Component

GO:0016021 : integral component of membrane
(https://www.ebi.ac.uk/QuickGO/term/GO:0016021)
GO:0010008 : endosome membrane
(https://www.ebi.ac.uk/QuickGO/term/GO:0010008)
GO:0005789 : endoplasmic reticulum membrane
(https://www.ebi.ac.uk/QuickGO/term/GO:0005789)
GO:0005765 : lysosomal membrane (https://www.ebi.ac.uk/QuickGO/term/GO:0005765)
GO:0033162 : melanosome membrane
(https://www.ebi.ac.uk/QuickGO/term/GO:0033162)

Presumptive Null

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

Molecular Type

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

Aberration Type

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

Deletion Size

1-9 bp

Molecular Details of the Mutation

1-bp deletion creating a frameshift and a truncated protein (519 amino acids instead of 805). In oca2S ohnolog on chromosome LG31.

Experimental Evidence

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

Main Reference

The Genetic Basis of Morphological Diversity in Domesticated Goldfish. (2020) (https://pubmed.ncbi.nlm.nih.gov/32392470)

Authors

Kon T; Omori Y; Fukuta K; Wada H; Watanabe M; Chen Z; Iwasaki M; Mishina T; Matsuzaki SS; Yoshihara D; Arakawa J; Kawakami K; Toyoda A; Burgess SM; Noguchi H; Furukawa T

Abstract

Although domesticated goldfish strains exhibit highly diversified phenotypes in morphology, the genetic basis underlying these phenotypes is poorly understood. Here, based on analysis of transposable elements in the allotetraploid goldfish genome, we found that its two subgenomes have evolved asymmetrically since a whole-genome duplication event in the ancestor of goldfish and common carp. We conducted whole-genome sequencing of 27 domesticated goldfish strains and wild goldfish. We identified more than 60 million genetic variations and established a population genetic structure of major goldfish strains. Genome-wide association studies and analysis of strain-specific variants revealed genetic loci associated with several goldfish phenotypes, including dorsal fin loss, long-tail, telescope-eye, albinism, and heart-shaped tail. Our results suggest that accumulated mutations in the asymmetrically evolved subgenomes led to generation of diverse phenotypes in the goldfish domestication history. This study is a key resource for understanding the genetic basis of phenotypic diversity among goldfish strains.

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Additional References

RELATED GEPHE

Related Genes

No matches found.

Related Haplotypes

1 (https://www.gephebase.org/search-criteria?/or+Gene Gephebase=^Oca2^/and+Taxon ID=^7957^/or+Gene Gephebase=^Oca2^/and+Taxon ID=^7957^#gephebase-summary-title)

EXTERNAL LINKS

COMMENTS