

GEPHE SUMMARY

| | | | |
|---|----------------|------------|--------------|
| pepsinogen A3 (https://www.gephebase.org/search-criteria?/and+Gene+Gephebase=~pepsinogen+A3~#gephebase-summary-title) | Gephebase Gene | GP00001926 | GepheID |
| Published | Entry Status | Courtier | Main curator |

PHENOTYPIC CHANGE

| | |
|--|------------------------|
| Physiology (https://www.gephebase.org/search-criteria?/and+Trait+Category=~Physiology~#gephebase-summary-title) | Trait Category |
| Digestion (absence of stomach) (https://www.gephebase.org/search-criteria?/and+Trait=~Digestion+(absence+of+stomach)~#gephebase-summary-title) | Trait |
| presence of stomach and gastric acid production | Trait State in Taxon A |
| loss of stomach and no gastric acid production | Trait State in Taxon B |
| Taxon A | Ancestral State |
| Intergeneric or Higher (https://www.gephebase.org/search-criteria?/and+Taxonomic+Status=~Intergeneric+or+Higher~#gephebase-summary-title) | Taxonomic Status |

| | | |
|---|-----------------------------|------------|
| Oreochromis niloticus (https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=~Oreochromis+niloticus~#gephebase-summary-title) | Taxon A | Latin Name |
| Nile tilapia | Common Name | |
| Oreochromis nilotica; Tilapia nilotica; Nile tilapia; Oreochromis niloticus (Linnaeus, 1758) | Synonyms | |
| species | Rank | |
| cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Deuterostomia; Chordata; Craniata; Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupecocephala; Euteleostomorpha; Neoteleostei; Eurypterygia; Ctenosquamata; Acanthomorpha; Euacanthomorpha; Percomorphaceae; Ovalentaria; Cichlomorphae; Cichliformes; Cichlidae; African cichlids; Pseudocrenilabrinae; Oreochromini; Oreochromis | Lineage | |
| Oreochromis () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=8139) | Parent | |
| 8128 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=8128) | NCBI Taxonomy ID | |
| No | is Taxon A an Intraspecies? | |

| | | |
|---|-----------------------------|------------|
| Oryzias latipes (https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=~Oryzias+latipes~#gephebase-summary-title) | Taxon B #1 | Latin Name |
| Japanese medaka | Common Name | |
| Poecilia latipes; Japanese medaka; Japanese rice fish; medaka; Oryzias latipes (Temminck & Schlegel, 1846); Poecilia latipes Temminck & Schlegel, 1846; Orizias latipes | Synonyms | |
| species | Rank | |
| cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Deuterostomia; Chordata; Craniata; Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupecocephala; Euteleostomorpha; Neoteleostei; Eurypterygia; Ctenosquamata; Acanthomorpha; Euacanthomorpha; Percomorphaceae; Ovalentaria; Atherinomorphae; Beloniformes; Adrianichthyoidei; Adrianichthyidae; Oryziinae; Oryzias | Lineage | |
| Oryzias () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=8089) | Parent | |
| 8090 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=8090) | NCBI Taxonomy ID | |
| No | is Taxon B an Intraspecies? | |

| | | |
|---|-------------|------------|
| Xiphophorus maculatus (https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=~Xiphophorus+maculatus~#gephebase-summary-title) | Taxon B #2 | Latin Name |
| southern platyfish | Common Name | |
| Platypoecilus maculatus; southern platyfish; Platypoecilus maculatus Guenther, 1866; Xiphophorus maculatus (Guenther, 1866) | Synonyms | |
| species | Rank | |
| cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Deuterostomia; Chordata; Craniata; Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Actinopterygii; Actinopteri; Neopterygii; Teleostei; Osteoglossocephalai; Clupecocephala; Euteleostomorpha; Neoteleostei; Eurypterygia; | Lineage | |

Ctenosquamata; Acanthomorpha; Eucanthomorpha; Percomorphaeae;
 Ovalentaria; Atherinomorphae; Cyprinodontiformes; Cyprinodontoidei; Poeciliidae;
 Poeciliinae; Xiphophorus

Parent

Xiphophorus () - (Rank: genus)
 (<https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=8082>)

NCBI Taxonomy ID

8083
 (<https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=8083>)

is Taxon B an Infrapopulation?

No

GENOTYPIC CHANGE

| | | |
|---|---|--|
| <p>PGA4</p> <p>-</p> <p>9606.ENSPO0000367391 (http://string-db.org/newstring.cgi/show_network_section.pl?identifier=9606.ENSPO0000367391)</p> <p>Belongs to the peptidase A1 family.</p> <p>GO:0004190 : aspartic-type endopeptidase activity (https://www.ebi.ac.uk/QuickGO/term/GO:0004190)</p> <p>GO:0006508 : proteolysis (https://www.ebi.ac.uk/QuickGO/term/GO:0006508) GO:0044267 : cellular protein metabolic process (https://www.ebi.ac.uk/QuickGO/term/GO:0044267) GO:0007586 : digestion (https://www.ebi.ac.uk/QuickGO/term/GO:0007586) GO:0030163 : protein catabolic process (https://www.ebi.ac.uk/QuickGO/term/GO:0030163)</p> <p>GO:0070062 : extracellular exosome (https://www.ebi.ac.uk/QuickGO/term/GO:0070062) GO:0097486 : multivesicular body lumen (https://www.ebi.ac.uk/QuickGO/term/GO:0097486)</p> <p>Yes (https://www.gephebase.org/search-criteria?/and+Presumptive+Null+=+Yes^#gephebase-summary-title)</p> <p>Gene Loss (https://www.gephebase.org/search-criteria?/and+Molecular+Type+=+Gene+Loss^#gephebase-summary-title)</p> <p>Deletion (https://www.gephebase.org/search-criteria?/and+Aberration+Type+=+Deletion^#gephebase-summary-title)</p> <p>-</p> <p>Absence of the gene in the genome sequence - high synteny</p> <p>Candidate Gene (https://www.gephebase.org/search-criteria?/and+Experimental+Evidence+=+Candidate+Gene^#gephebase-summary-title)</p> <p>Recurrent gene loss correlates with the evolution of stomach phenotypes in gnathostome history. (2014) (https://pubmed.ncbi.nlm.nih.gov/24307675)</p> <p>Castro LF; Gonçálves O; Mazan S; Tay BH; Venkatesh B; Wilson JM</p> <p>The stomach, a hallmark of gnathostome evolution, represents a unique anatomical innovation characterized by the presence of acid- and pepsin-secreting glands. However, the occurrence of these glands in gnathostome species is not universal; in the nineteenth century the French zoologist Cuvier first noted that some teleosts lacked a stomach. Strikingly, Holocephali (chimaeras), dipnoids (lungfish) and monotremes (egg-laying mammals) also lack acid secretion and a gastric cellular phenotype. Here, we test the hypothesis that loss of the gastric phenotype is correlated with the loss of key gastric genes. We investigated species from all the main gnathostome lineages and show the specific contribution of gene loss to the widespread distribution of the agastric condition. We establish that the stomach loss correlates with the persistent and complete absence of the gastric function gene <i>kit-H(+)/K(+)-ATPase</i> (<i>Atp4A</i> and <i>Atp4B</i>) and pepsinogens (<i>Pga</i>, <i>Pgc</i>, <i>Cym</i>)--in the analysed species. We also find that in gastric species the pepsinogen gene complement varies significantly (e.g. two to four in teleosts and tens in some mammals) with multiple events of pseudogenization identified in various lineages. We propose that relaxation of purifying selection in pepsinogen genes and possibly proton pump genes in response to dietary changes led to the numerous independent events of stomach loss in gnathostome history. Significantly, the absence of the gastric genes predicts that reinvention of the stomach in agastric lineages would be highly improbable, in line with Dollo's principle.</p> | <p>Generic Gene Name</p> <p>P0DJD7 (http://www.uniprot.org/uniprot/P0DJD7)</p> <p>Synonyms</p> <p>0</p> <p>String</p> <p>Sequence Similarities</p> <p>GO - Molecular Function</p> <p>GO - Biological Process</p> <p>GO - Cellular Component</p> | <p>UniProtKB Homo sapiens</p> <p>GenebankID or UniProtKB</p> <p>Presumptive Null</p> <p>Molecular Type</p> <p>Aberration Type</p> <p>Deletion Size</p> <p>Molecular Details of the Mutation</p> <p>Experimental Evidence</p> <p>Main Reference</p> <p>Authors</p> <p>Abstract</p> <p>Additional References</p> |
|---|---|--|

RELATED GEPHE

4 (ATP4A, ATP4B, pepsinogen A1, pepsinogen A2) (<https://www.gephebase.org/search-criteria?/or+Taxon+ID+=+8128^/and+Trait=Digestion/or+Taxon+ID+=+8090^/and+Trait=Digestion/or+Taxon+ID+=+8083^/and+Trait=Digestion/and+groupHaplotypes=true#gephebase-summary-title>)

Related Genes

Related Haplotypes

EXTERNAL LINKS

COMMENTS

There are three pepsinogen A genes in teleost fishes - their nomenclature and phylogenetic relationships are different from Mammals pepsinogen genes