

## GEPHE SUMMARY

<p>ATP4B (<a href="https://www.gephebase.org/search-criteria?/and+Gene+Gephebase=^ATP4B^#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Gene+Gephebase=^ATP4B^#gephebase-summary-title</a>)</p> <p>Published</p>	<p>Gephebase Gene</p> <p>Entry Status</p>	<p>GP00001916</p> <p>Courtier</p>	<p>GepheID</p> <p>Main curator</p>
---	---	-----------------------------------	------------------------------------

## PHENOTYPIC CHANGE

<p>Physiology (<a href="https://www.gephebase.org/search-criteria?/and+Trait+Category=^Physiology^#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Trait+Category=^Physiology^#gephebase-summary-title</a>)</p> <p>Digestion (absence of stomach) (<a href="https://www.gephebase.org/search-criteria?/and+Trait=^Digestion+absence+of+stomach^#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Trait=^Digestion+absence+of+stomach^#gephebase-summary-title</a>)</p> <p>presence of stomach and gastric acid production</p> <p>loss of stomach and no gastric acid production</p> <p>Taxon A</p> <p>Intergeneric or Higher (<a href="https://www.gephebase.org/search-criteria?/and+Taxonomic+Status=^Intergeneric+or+Higher^#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Taxonomic+Status=^Intergeneric+or+Higher^#gephebase-summary-title</a>)</p>	<p>Trait Category</p> <p>Trait</p> <p>Trait State in Taxon A</p> <p>Trait State in Taxon B</p> <p>Ancestral State</p> <p>Taxonomic Status</p>	<p>Scyliorhinus canicula (<a href="https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=^Scyliorhinus+canicula^#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=^Scyliorhinus+canicula^#gephebase-summary-title</a>)</p> <p>smaller spotted catshark</p> <p>smaller spotted catshark; smaller spotted dogfish; spotted catshark; spotted dogfish; Scyliorhinus canicula (Linnaeus, 1758); Scyliorhinus caniculus</p> <p>species</p> <p>cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Deuterostomia; Chordata; Craniata; Vertebrata; Gnathostomata; Chondrichthyes; Elasmobranchii; Selachii; Galeomorphii; Galeoidea; Carcharhiniformes; Scyliorhinidae; Scyliorhinus</p> <p>Scyliorhinus () - (Rank: genus) (<a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=7829">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=7829</a>)</p> <p>7830 (<a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=7830">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=7830</a>)</p> <p>is Taxon A an Intraspecies?</p> <p>No</p>	<p>Latin Name</p> <p>Common Name</p> <p>Synonyms</p> <p>Rank</p> <p>Lineage</p> <p>Parent</p> <p>NCBI Taxonomy ID</p> <p>is Taxon B an Intraspecies?</p>	<p>Callorhynchus milii (<a href="https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=^Callorhynchus+milii^#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=^Callorhynchus+milii^#gephebase-summary-title</a>)</p> <p>elephant shark</p> <p>elephant shark; Australian ghost shark; elephant fish; ghost shark; makorepe; plownose chimaera; reperepe; Callorhynchus milii Bory de Saint-Vincent, 1823; Callorhynchus milii</p> <p>species</p> <p>cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Deuterostomia; Chordata; Craniata; Vertebrata; Gnathostomata; Chondrichthyes; Holocephali; Chimaeriformes; Callorhynchidae; Callorhynchus</p> <p>Callorhynchus () - (Rank: genus) (<a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=7866">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=7866</a>)</p> <p>7868 (<a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=7868">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=7868</a>)</p> <p>is Taxon B an Intraspecies?</p> <p>No</p>	<p>Latin Name</p> <p>Common Name</p> <p>Synonyms</p> <p>Rank</p> <p>Lineage</p> <p>Parent</p> <p>NCBI Taxonomy ID</p> <p>is Taxon B an Intraspecies?</p>
---	---	---	--	--	--

## GENOTYPIC CHANGE

<p>ATP4B</p> <p>ATP6B</p> <p>9606.ENSP00000334216 (<a href="http://string-db.org/newstring.cgi/show_network_section.pl?identifier=9606.ENSP00000334216">http://string-db.org/newstring.cgi/show_network_section.pl?identifier=9606.ENSP00000334216</a>)</p> <p>Belongs to the X(+)/potassium ATPases subunit beta family.</p> <p>GO:0001671 : ATPase activator activity (<a href="https://www.ebi.ac.uk/QuickGO/term/GO:0001671">https://www.ebi.ac.uk/QuickGO/term/GO:0001671</a>)</p> <p>GO:0008900 : potassium:proton exchanging ATPase activity (<a href="https://www.ebi.ac.uk/QuickGO/term/GO:0008900">https://www.ebi.ac.uk/QuickGO/term/GO:0008900</a>)</p> <p>GO:0007155 : cell adhesion (<a href="https://www.ebi.ac.uk/QuickGO/term/GO:0007155">https://www.ebi.ac.uk/QuickGO/term/GO:0007155</a>)</p> <p>GO:0034220 : ion transmembrane transport</p>	<p>Generic Gene Name</p> <p>Synonyms</p> <p>String</p> <p>Sequence Similarities</p> <p>GO - Molecular Function</p> <p>GO - Biological Process</p>	<p>P51164 (<a href="http://www.uniprot.org/uniprot/P51164">http://www.uniprot.org/uniprot/P51164</a>)</p> <p>()</p> <p>UniProtKB Homo sapiens</p> <p>GenebankID or UniProtKB</p>
---	---	--

(<https://www.ebi.ac.uk/QuickGO/term/GO:0034220>)

GO:0032496 : response to lipopolysaccharide

(<https://www.ebi.ac.uk/QuickGO/term/GO:0032496>)

GO:0030007 : cellular potassium ion homeostasis

(<https://www.ebi.ac.uk/QuickGO/term/GO:0030007>)

GO:0006883 : cellular sodium ion homeostasis

(<https://www.ebi.ac.uk/QuickGO/term/GO:0006883>)

GO:1990573 : potassium ion import across plasma membrane

(<https://www.ebi.ac.uk/QuickGO/term/GO:1990573>)

GO:0036376 : sodium ion export across plasma membrane

(<https://www.ebi.ac.uk/QuickGO/term/GO:0036376>)

GO:0010243 : response to organonitrogen compound

(<https://www.ebi.ac.uk/QuickGO/term/GO:0010243>)

GO:0010248 : establishment or maintenance of transmembrane electrochemical gradient

(<https://www.ebi.ac.uk/QuickGO/term/GO:0010248>)

GO - Cellular Component

GO:0005886 : plasma membrane (<https://www.ebi.ac.uk/QuickGO/term/GO:0005886>)

GO:0005890 : sodium:potassium-exchanging ATPase complex

(<https://www.ebi.ac.uk/QuickGO/term/GO:0005890>)

Presumptive Null

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

Molecular Type

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

Aberration Type

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

Deletion Size

-

Molecular Details of the Mutation

Absence of the gene in the genome sequence

Experimental Evidence

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

Main Reference

Recurrent gene loss correlates with the evolution of stomach phenotypes in gnathostome history. (2014) (<https://pubmed.ncbi.nlm.nih.gov/24307675>)

Authors

Castro LF; Gonalves O; Mazan S; Tay BH; Venkatesh B; Wilson JM

Abstract

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 kit-H(+)/K(+)-ATPase (Atp4A and Atp4B) and pepsinogens (Pga, Pgc, Cym)--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.

Additional References

## RELATED GEPHE

Related Genes

No matches found.

Related Haplotypes

No matches found.

## EXTERNAL LINKS

## COMMENTS