

# Novel regulators of growth identified in the evolution of fin proportion in flying fish

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## What is the Manuscript Microscope Sentence Audit?

The Manuscript Microscope Sentence Audit is a research paper introspection system that parses the text of your manuscript into minimal sentence components for faster, more accurate, enhanced proofreading.

## Why use a Sentence Audit to proofread your manuscript?

- **Accelerated Proofreading:** Review long technical papers in a fraction of the usual time.
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**Manuscript Source:** <https://www.biorxiv.org/content/10.1101/2021.03.05.434157v1>

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### Features of the Sentence Audit:

The Sentence Audit combines two complementary proofreading approaches:

1. Each sentence of your text is parsed and displayed in isolation for focused inspection.
2. Each individual sentence is further parsed into Minimal Sentence Components for a deeper review of the clarity, composition and consistency of the language you used.

The Minimal Sentence Components shown are the smallest coherent elements of each sentence of your text as derived from it's conjunctions, prepositions and selected punctuation symbols (i.e. commas, semicolons, round and square brackets).

The combined approaches ensure easier, faster, more effective proofreading.

### Comments and Caveats:

- The sentence parsing is achieved using a prototype Python natural language processing pipeline and may result in occasional sentence segmentation or parsing errors.
- Depending on the source of the input text, the Sentence Audit may contain occasional html artefacts that are parsed as sentences (E.g. "Download figure. Open in new tab").
- Always consult the original research paper as the true reference source of the text.

### Contact Information:

To get a Manuscript Microscope Sentence Audit of any other research paper, simply forward any copy of the text to [John.James@OxfordResearchServices.com](mailto:John.James@OxfordResearchServices.com).

All queries, feedback or suggestions are also very welcome.

### Research Paper Sections:

The sections of the research paper input text parsed in this audit.

[illegible]

**Title**      **Novel regulators of growth identified in the evolution of fin proportion in flying fish**

**S1 [001]      Abstract**

**S1 [002]**      Identifying the genetic foundations of trait variation and evolution is challenging as it is often difficult to parse meaningful signals from confounding signatures such as drift and epistasis.

Identifying the genetic foundations ...  
... of trait variation ...  
... and evolution is challenging ...  
... as it is often difficult ...  
... to parse meaningful signals ...  
... from confounding signatures ...  
... such as drift ...  
... and epistasis.

**S1 [003]**      However, identification of the genetic loci underlying morphological and physiological traits can be honed through the use of comparative and complementary genetic approaches, whereby shared sets of genes that are repeatedly implicated across large evolutionary time periods as under selection can illuminate important pathways and epistatic relationships that function as novel regulators of trait development.

However, ...  
... identification ...  
... of the genetic loci underlying morphological ...  
... and physiological traits can be honed ...  
... through the use ...  
... of comparative ...  
... and complementary genetic approaches, ...  
... whereby shared sets ...  
... of genes ...  
... that are repeatedly implicated ...  
... across large evolutionary time periods ...  
... as ...  
... under selection can illuminate important pathways ...  
... and epistatic relationships ...  
... that function ...  
... as novel regulators ...  
... of trait development.

**S1 [004]**      Here we intersect comparative genomic analyses with unbiased mutagenesis screens in distantly related species to define the control of proportional growth, as changes in the size and relative proportions of tissues underlie a large degree of the variant forms seen in nature.

Here we intersect comparative genomic analyses ...  
... with unbiased mutagenesis screens ...  
... in distantly related species ...

... to define the control ...  
... of proportional growth, ...  
... as changes ...  
... in the size ...  
... and relative proportions ...  
... of tissues underlie a large degree ...  
... of the variant forms seen ...  
... in nature.

**S1 [005]** Through a phylogenomic analysis of genome-wide variation in 35 species of flying fishes and relatives, we identify genetic signatures in both coding and regulatory regions underlying the convergent evolution of increased paired fin size and aerial gliding behaviors, key innovations for flying fishes and flying halfbeaks.

Through a phylogenomic analysis ...  
... of genome-wide variation ...  
... in 35 species ...  
... of flying fishes ...  
... and relatives, ...  
... we identify genetic signatures ...  
... in both coding ...  
... and regulatory regions underlying the convergent evolution ...  
... of increased paired fin size ...  
... and aerial gliding behaviors, ...  
... key innovations ...  
... for flying fishes ...  
... and flying halfbeaks.

**S1 [006]** To refine our analysis, we intersected convergent phylogenomic signatures with mutants identified in distantly related zebrafish with altered fin size.

To refine our analysis, ...  
... we intersected convergent phylogenomic signatures ...  
... with mutants identified ...  
... in distantly related zebrafish ...  
... with altered fin size.

**S1 [007]** Through these paired approaches, we identify a surprising role for an L-type amino acid transporter, lat4a, and the potassium channel, kcnh2a, in the regulation of fin proportion.

Through these paired approaches, ...  
... we identify a surprising role ...  
... for an L-type amino acid transporter, ...  
... lat4a, ...  
... and the potassium channel, ...  
... kcnh2a, ...  
... in the regulation ...  
... of fin proportion.

**S1 [008]** We show that specific epistatic interaction between these genetic loci in zebrafish closely phenocopies the observed fin proportions of flying fishes.

We show ...  
... that specific epistatic interaction ...

... between these genetic loci ...  
... in zebrafish closely phenocopies the observed fin proportions ...  
... of flying fishes.

**S1 [009]** The congruence of experimental and phylogenomic findings point to a conserved, non-canonical signaling interaction that integrates bioelectric cues and amino acid transport in the establishment of relative size in development and evolution.

The congruence ...  
... of experimental ...  
... and phylogenomic findings point ...  
... to a conserved, ...  
... non-canonical signaling interaction ...  
... that integrates bioelectric cues ...  
... and amino acid transport ...  
... in the establishment ...  
... of relative size ...  
... in development ...  
... and evolution.

## **S2 [010] Introduction**

**S2 [011]** Changes to allometry, or the relative proportions of organs and tissues within organisms, is a common means for adaptive character change in evolution.

Changes ...  
... to allometry, ...  
... or the relative proportions ...  
... of organs ...  
... and tissues ...  
... within organisms, ...  
... is a common means ...  
... for adaptive character change ...  
... in evolution.

**S2 [012]** However, little is understood about how relative size is specified during development and shaped during evolution.

However, ...  
... little is understood ...  
... about how relative size is specified ...  
... during development ...  
... and shaped ...  
... during evolution.

**S2 [013]** Actinopterygian (ray-finned) fishes provide rich opportunities to study variation in proportion, as they are the most species-rich and diverse class of vertebrates with over 30,000 species [1].

Actinopterygian ...

... (ray-finned) ...  
... fishes provide rich opportunities ...  
... to study variation ...  
... in proportion, ...  
... as they are the most species-rich ...  
... and diverse class ...  
... of vertebrates ...  
... with over 30,000 species ...  
... [1].

**S2 [014]** The actinopterygian fin exhibits dramatic changes in size and shape that not only impacts movement and balance, but has been modified into more elaborate innovations, including lures, defensive spines and sucking disks.

The actinopterygian fin exhibits dramatic changes ...  
... in size ...  
... and shape ...  
... that not ...  
... only impacts movement ...  
... and balance, ...  
... but has been modified ...  
... into more elaborate innovations, ...  
... including lures, ...  
... defensive spines ...  
... and sucking disks.

**S2 [015]** Not surprisingly, in many actinopterygian species, modification of the size and shape of the fin is a defining and ecologically important trait.

Not surprisingly, ...  
... in many actinopterygian species, ...  
... modification ...  
... of the size ...  
... and shape ...  
... of the fin is a defining ...  
... and ecologically important trait.

**S2 [016]** Several actinopterygian lineages have independently evolved elongated, wing-like fins that enable gliding through the air [2].

Several actinopterygian lineages have independently evolved elongated, ...  
... wing-like fins ...  
... that enable gliding ...  
... through the air ...  
... [2].

**S2 [017]** Among the most accomplished aerial gliders are members of the family Exocoetidae (Beloniformes), or the “flying fishes”.

Among the most accomplished aerial gliders are members ...  
... of the family Exocoetidae ...  
... (Beloniformes), ...  
... or the “flying fishes”.

## **End of Sample Audit**

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