

Decoding the mitogenome of *Argopecten ventricosus* (Bivalvia: Pectinidae)

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Background

Argopecten ventricosus (= *circularis*) (G. S. Sowerby II, 1842) occurs in the Tropical Eastern Pacific, inhabiting sea surface temperatures between 16°C and 29°C, ranging from California, USA (34.4°N) to the north coast of Peru, Piura (5.9°S). Occasionally, it could extend to the central Peruvian coast (Santa, 8.59°S) during the incursion of El Niño warm waters.

Contrasting to its sister species, *Argopecten purpuratus* (Lamarck, 1819), the ecology and evolutionary history of *A. ventricosus* in Peru is scarcely studied.

The oldest fossil records of *A. ventricosus* (see map, orange circle) date back to the middle Miocene (14-11 Ma) in Cabo Falcón, Venezuela. Other records (see map, yellow circles) suggest its presence in Ecuador and California

since the Pliocene (5.3 - 2.6 Ma). However, a taxonomic revision is required.

Fossil calibrated molecular phylogenetics can elucidate when the most recent common ancestor of *A. ventricosus* diverged. To address this question, we characterised the first Peruvian mitogenome of *A. ventricosus* obtained from whole-genome sequencing.

What did we do?

Sample collection:
Sechura Bay (North Coast Peru)

DNA Extraction & Quality

Fenol/Chloroform Method
Qubit dsDNA Electrophoresis

Sequencing

Whole Genome Sequencing
Illumina (NovaSeq 6000)

Bioinformatics Analysis

FASTQC
Trimmomatic
GetOrganelle

Mitochondrial characterization

MITOS Web Server
Geneious Prime

Phylogenetic analysis

BEAST 2 (FBD model)

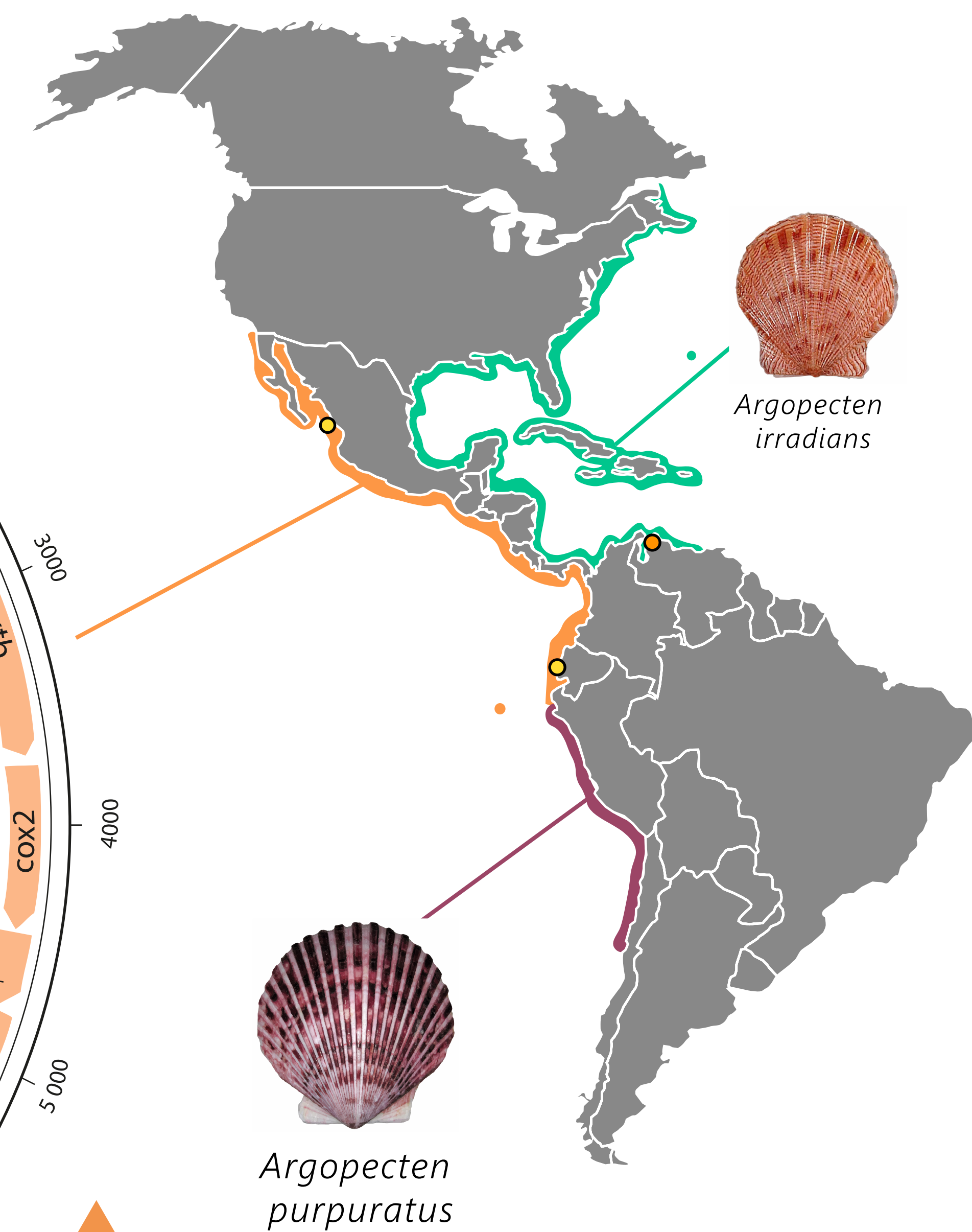
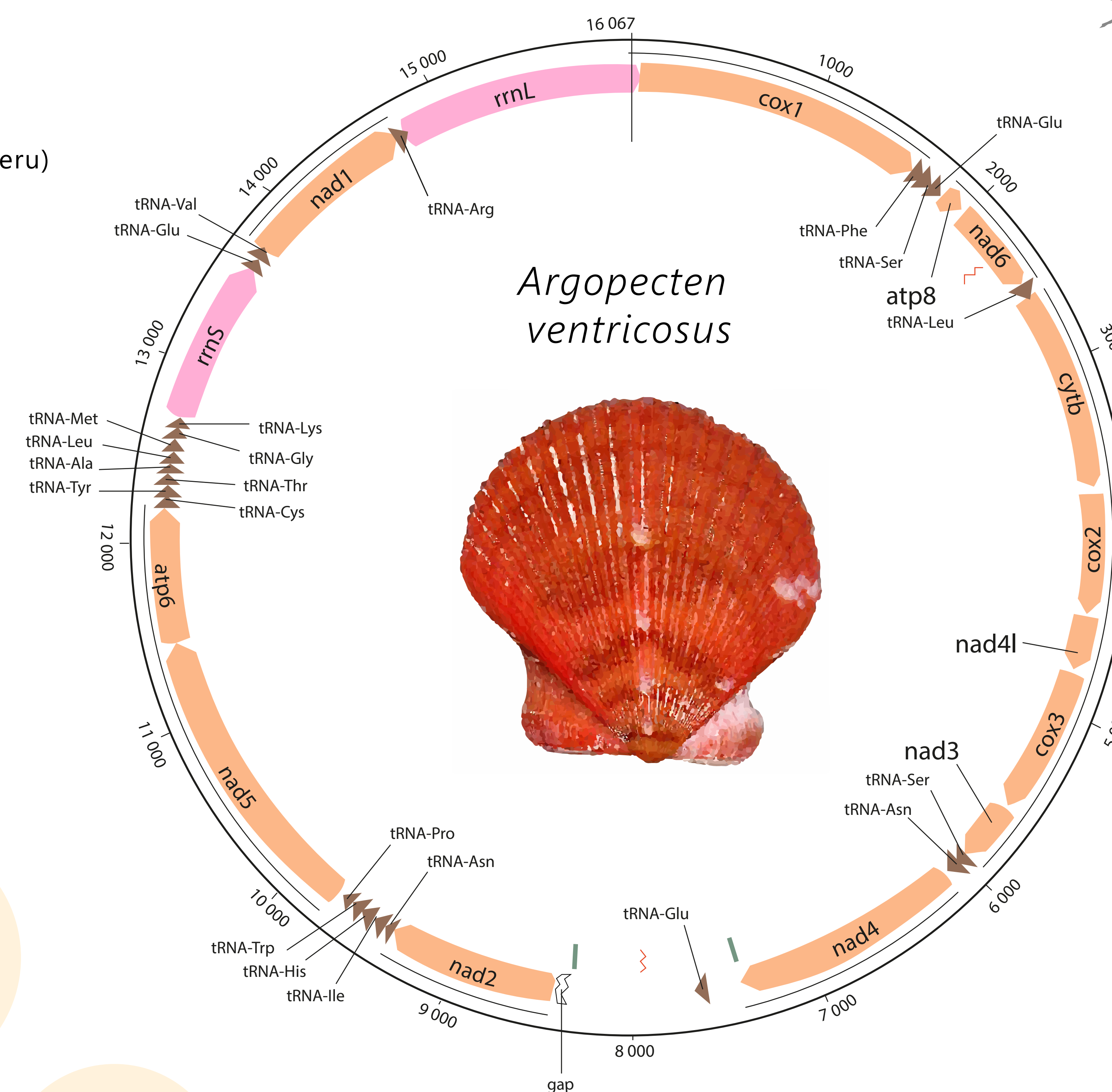
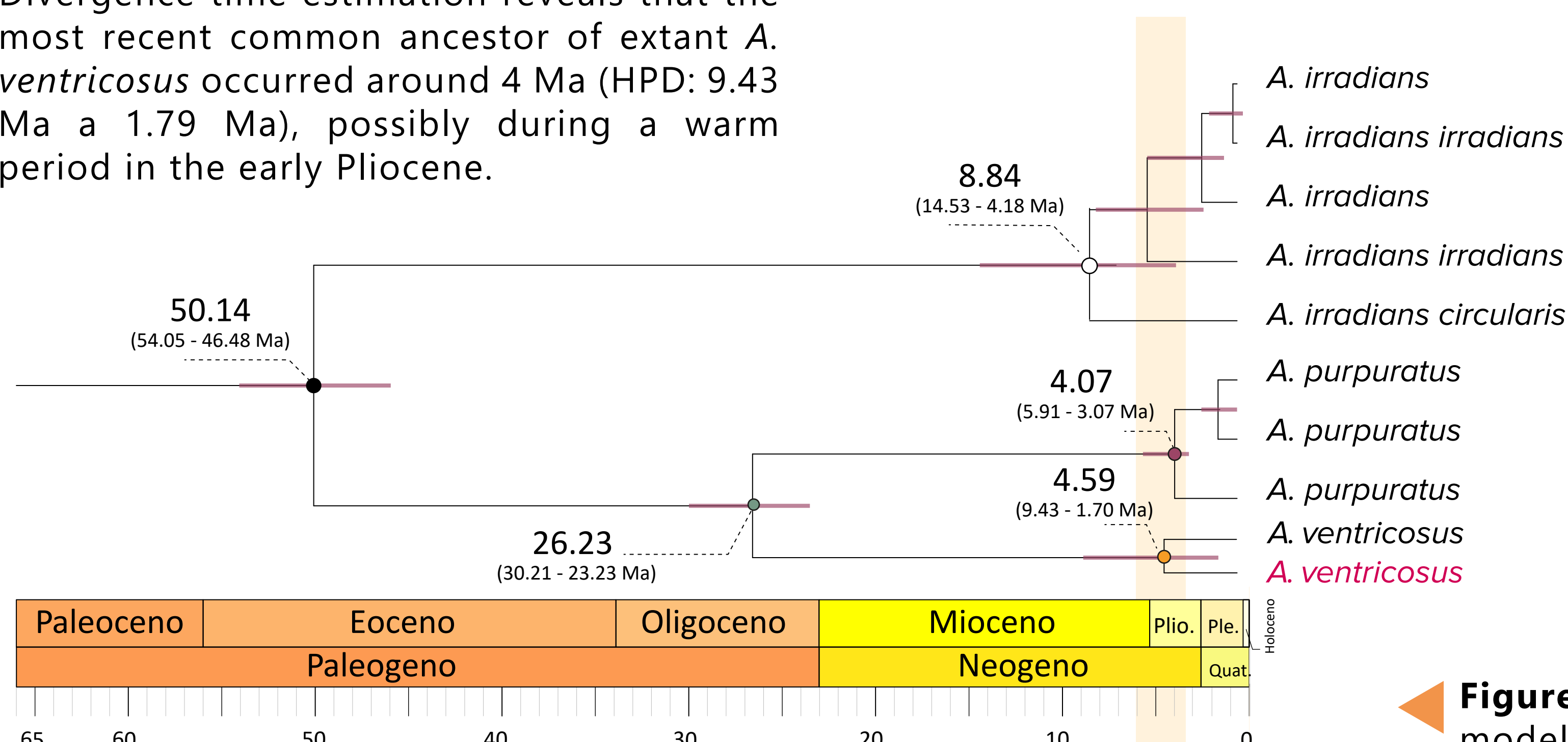


Figure 1. Actual distribution of the *Argopecten* genus with available mitogenomic sequences: *A. purpuratus* (purple), *A. ventricosus* (orange), and *A. irradians* (turquoise). Fossils of *A. ventricosus* (black circles).

Figure 2. *Argopecten ventricosus* Mitochondrial genome annotated with MITOS Web Server: Coding sequences (orange), ribosomal RNAs (pink), tRNA (brown).

What did we find?

Divergence time estimation reveals that the most recent common ancestor of extant *A. ventricosus* occurred around 4 Ma (HPD: 9.43 Ma a 1.79 Ma), possibly during a warm period in the early Pliocene.



Open Questions & Further Studies

When *A. ventricosus* might have dispersed to Pacific Ocean? Which was its potential distribution range?

Sampling and collaborative research in the Central Eastern Pacific region are necessary to further advance *A. ventricosus* research in the Tropical Eastern Pacific. A thorough fossil taxonomic revision is also crucial.

Comparative genomics with Atlantic *Argopecten* specimens would help to clarify the history of the *Argopecten* genus and identify sites that have undergone positive selection to anoxic environment adaptation in Pacific species.

Figure 3. Portion of the phylogeny obtained with the FBD model calibrated with fossils. Light-purple bars: 95% HPD.

KEY REFERENCES

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