

Outline

- General information (FUN FACTS)
- Genome paper
- General genome information
- Sequencing strategy
- Sequencing methods
- Genome assembly
- Genome outcome



General information (FUN FACTS)

THEY LIVE IN ALL 5 OCEANS



General information (FUN FACTS)

THEIR DIET IS FULL OF DELICACIES



General information (FUN FACTS)

THEY PREFER TO REPRODUCE IN THE SUMMER



Genome paper

SPECIAL SECTION

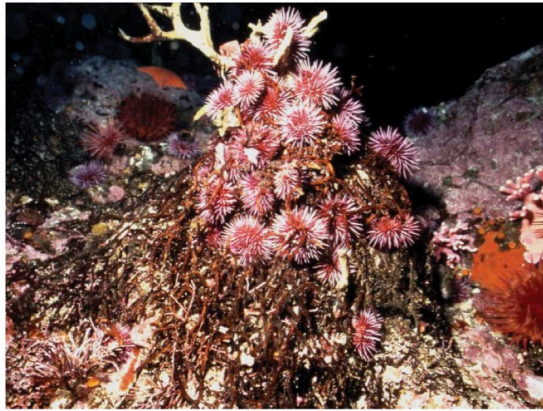


Fig. 1. Purple sea urchins (*S. purpuratus*) grazing on the remains of a giant kelp hold fast after an unusually heavy recruitment in Carmel Bay, California (7). [Photo courtesy of J. M. Watanabe]

There are important differences among the different species: Some are more effective as grazers than others, and they vary in their diets, growth rates, longevities, and importance in fisheries. Some show no sign of senility and live for well over a century (17). Elucidation of their

genomes will open new avenues of research into the underlying genetic and evolutionary bases of these variations.

References and Notes

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18. I thank J. Watanabe for providing the photo used in Fig. 1, L. Rogers-Bennett for sharing her manuscript with me, V. Pearse and an anonymous reviewer for providing comments on the manuscript, and R. A. Cameron for inviting me to prepare it.

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Science

The Genome of the Sea Urchin *Strongylocentrotus purpuratus*

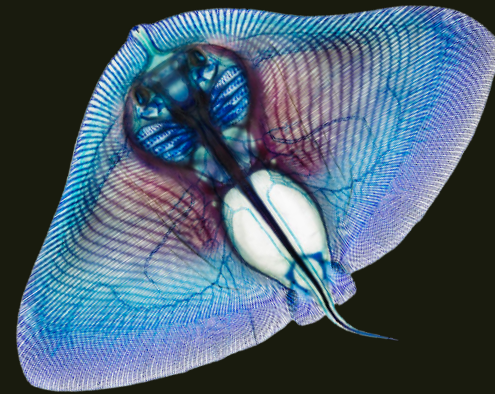
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The background of the slide is a dark blue field filled with numerous sea urchin embryos. Each embryo is a small, elongated, cylindrical structure with a glowing cyan outer shell. Inside each embryo, a glowing green DNA double helix is visible, winding through the center. The embryos are scattered across the frame, some in focus and others blurred in the background. A white L-shaped graphic element is positioned in the upper left corner, partially overlapping the text box.

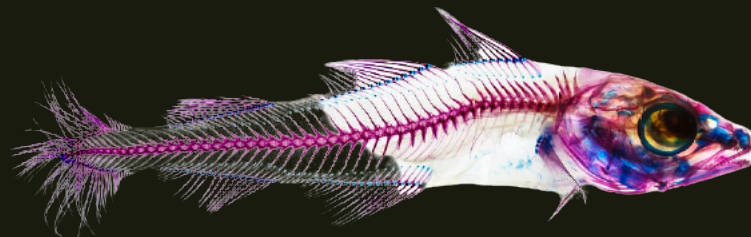
General genome information

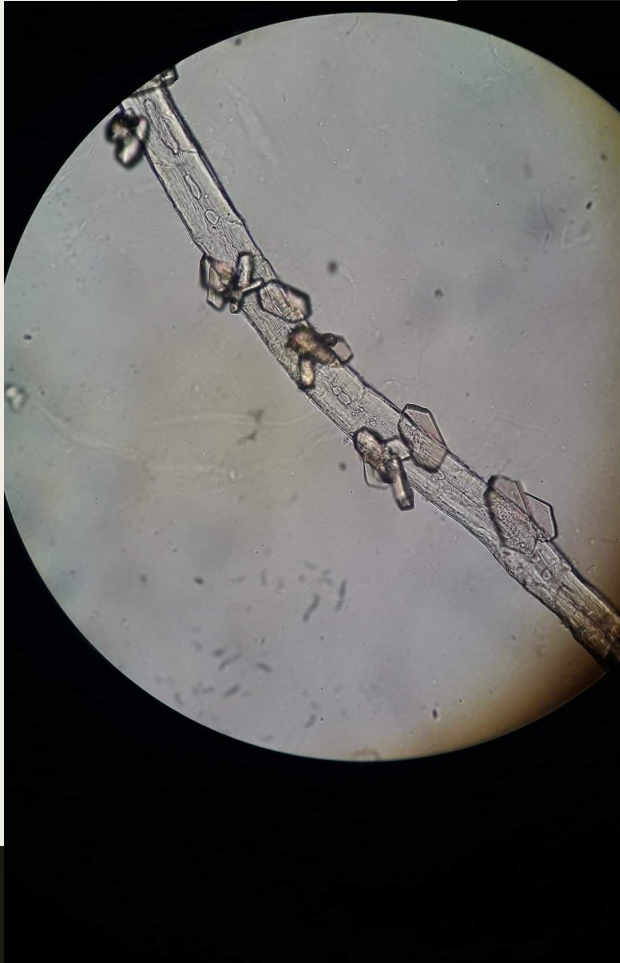
The sea urchin is estimated to have 23,300 genes



GENERAL GENOME INFORMATION

Some genes thought to be vertebrate-specific were found in the sea urchin.





GENERAL GENOME INFORMATION

Distinct genes for bio-mineralization exist in the sea urchin and vertebrates.

Sequencing strategy

The overall approach was based on the
“combined strategy”
where WGS sequencing to
six times coverage was combined with
Two times sequence coverage of BAC clones
from a minimal tiling path (MTP)

Sequencing methods

Two techniques were used to sequence the sea urchin genome:

- A. Whole-genome shotgun
- B. Bacterial artificial chromosome (BAC) sequencing



Genome assembly

Two different assemblies were performed in this research:

1. WGS sequencing assembly
2. Combined BAC-WGS assembly

Genome outcome

- ✓ The estimated 23,300 genes are similar to these estimated for vertebrates.
- ✓ There are cases of gene families that are expanded in vertebrates compared with sea urchin.
- ✓ New biological niche sampled by the sea urchin genome provides not only a clearer review of the deuterosomes and bilaterian ancestor, but has also provided a number of surprises.
- ✓ There are many pathways shared by sea urchin and human.
- ✓ The immense diversity of pathogen-binding motifs included in the search engine on provides an invaluable resource for anti-microbial applications and the identification of new deuterosomes Immune functions with direct relevance to human.