Discovering the uncharacterizable world under the sea using genetic tools

Keynote Edu-lab 2
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Acknowledgment
Structure of scientific work

• Introduction
  • Overview
  • Hypothesis
• Material
• Methods
• Results
• Discussion
General Introduction

Subject: Biology
Useful background knowledge: Genetic basics (DNA structure)

- Southern Ocean
- Antarctic toothfish
  - Adaptation
  - Commercial fishery
- Threats
  - Illegal fishing
  - Sold on the market using wrong labels

**Hypothesis 1:** Genetic analyses help us to identify species. This can help us to find out which fish is sold on the market and if it was illegally caught.
Worksheet 1: Genetic analyses of Antarctic toothfish

• Material
  • 7 samples of “Antarctic fish” from the market

• Methods
  • DNA extraction
    ➔ apply for the DNA extraction box!!
  • DNA multiplication (PCR) and DNA-Sequencing
    ➔ watch YouTube videos provided or others
Sequence Analyses

BLAST search
Results and Discussion

- DNA 1
- DNA 2
- DNA 3
- DNA 4
- DNA 5
- DNA 6
- DNA 7

Pleuragramma antarctica
Dissostichus mawsoni
Dissostichus eleginoides

Homo sapiens???
Worksheet 2: Phylogenetic analyses of cod fishes

Arctic cod fishes: *Boreogadus saida* and *Arctogadus glacialis*

Hypothesis 2:
All the so-called cod fishes are closely related to each other (‘monophyletic’) and have similar DNA sequences although they are found in different regions.

Atlantic cod fish: *Gadus morhua*

Pacific cod fish: *Gadus macrocephalus*

Antarctic cod fish: *Dissostichus mawsoni*
Material


Create a FASTA file with several DNA sequences.
Methods

• Sequence alignment with MUSCLE: http://www.ebi.ac.uk/Tools/msa/muscle/

1. Insert FASTA file with several DNA sequences.
2. Submit your sequences.
3. Download Alignment File.
Methods

- Reconstruction of phylogenetic tree: [http://www.phylogeny.fr/simple_phylogeny.cgi](http://www.phylogeny.fr/simple_phylogeny.cgi)

1. Insert your alignment.
2. Submit your sequences.
Results and Discussion

Dissostichus mawsoni_1
Dissostichus mawsoni_2
Arctogadus glacialis_1
Arctogadus glacialis_2
Boreogadus saida_1
Boreogadus saida_2
Gadus macrocephalus_1
Gadus macrocephalus_2
Gadus morhua_1
Gadus morhua_2

Icefish
Cod fishes
Questions? Suggestions? Ideas?

Thank you!!!