Discovering the uncharacterizable world under the sea using genetic tools

Keynote Edu-lab 2

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MEERwert.
Polare Biodiversität.

AQUATIC ECOSYSTEM RESEARCH

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Open-Minded

Acknowledgment

HOCHSCHULWETTBEWERB
Im Wissenschaftsjahr 2016*17 – Meere Ozeane
Zeigt eure Forschung!

Eine Initiative des Bundesministeriums für Bildung und Forschung
Wissenschaftsjahr 2016*17
MEERE UND OZEANE

GEFÖRDERT VOM
Bundesministerium für Bildung und Forschung

wissenschaft : im dialog

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

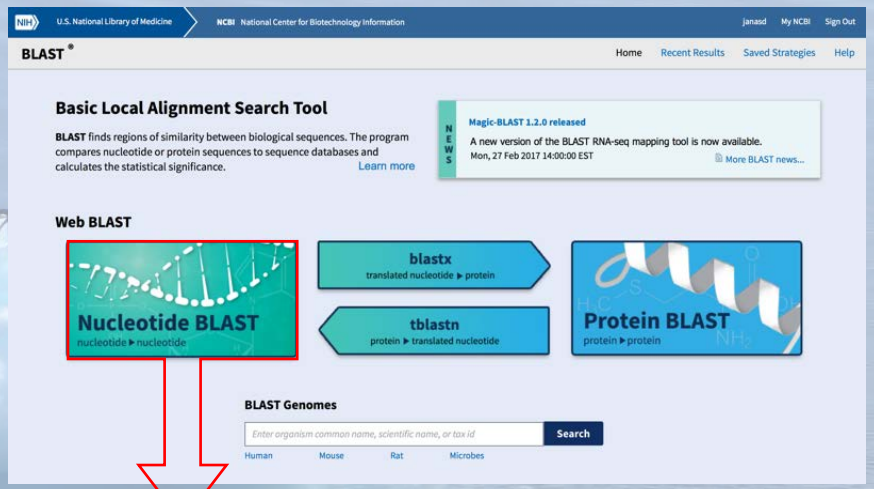
Hypothesis 1:
Genetic analyses help us to identify species. This can help us to find out which fish is sold on the market and if it was illegally caught.

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
https://blast.ncbi.nlm.nih.gov/Blast.cgi

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>DNA1
CCTTATGATCGGGGCCCCCGACATAGCTTTCCCCCGTATGAATAATATGAGCTTCTGACTCCTGCCCCCCTCATTCCTCCTCTTAC
>DNA2
CCTCATGATCGGGGCCCCCGACATGGCTTTCCCTCGAATAAATAATATGAGTTTCTGGCTCCTCCCTCCCTCCTTCCTACTCTT
>DNA3
CTCATCCCCCTTATGATCGGGGCCCCCGACATAGCTTTCCCCCGTATGAATAATATGAGCTTCTGACTCCTGCCCCCCTCATTCCTCCTCTTAC
>DNA4
CTCATGATCGGGGCCCCCGACATGGCTTTCCCTCGAATAAATAATATGAGTTTCTGGCTCCTCCCTCCCTCCTTCCTACTCT
>DNA5
TCATGATCGGAGCCCCCGACATGGCTTTCCCCCGAATAAATAATATGAGTTTCTGGCTCCTTCCTCCCTCCTTCCTACTACT
>DNA6
CCTCCTTTAGCAGGGAACTACTCCCACCCTGGAGCCTCCGTAGACCTAACCATCTTCTCCTTACACCTAGCAGGTGTCTCCTCTAT
>DNA7
TCCCCCTCATGATCGGAGCCCCCGACATGGCTTTCCCCCGAATAAATAATATGAGTTTCTGGCTCCTTCCTCCCTCCTTCCTACTA
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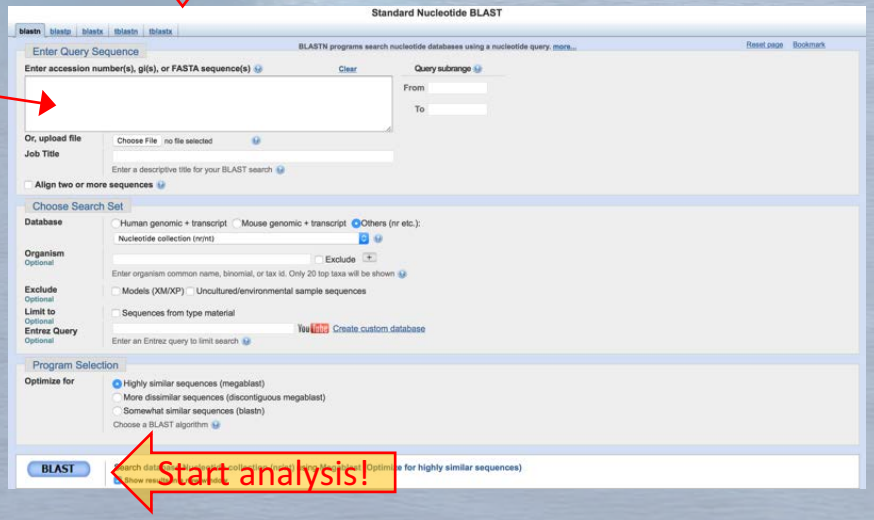


Results and Discussion

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

Worksheet 2:
Phylogenetic analyses of cod fishes

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

Atlantic cod fish: *Gadus morhua*

Pacific cod fish: *Gadus macrocephalus*

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

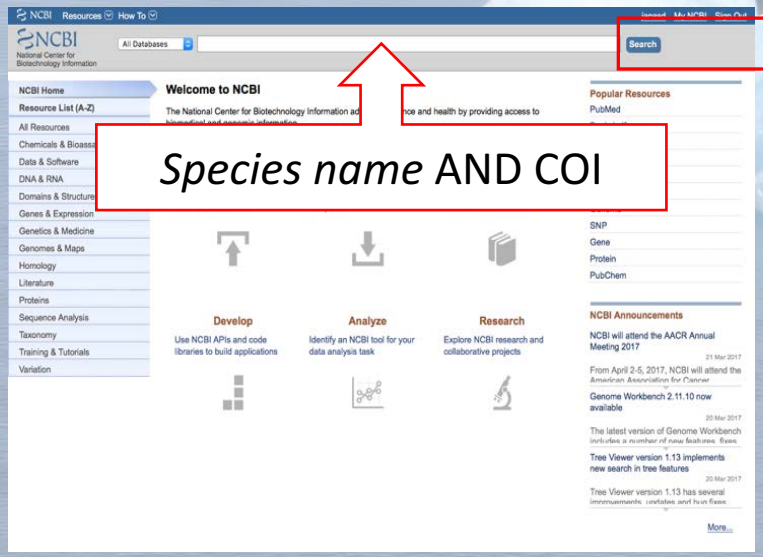
Pacific Ocean

Ocean

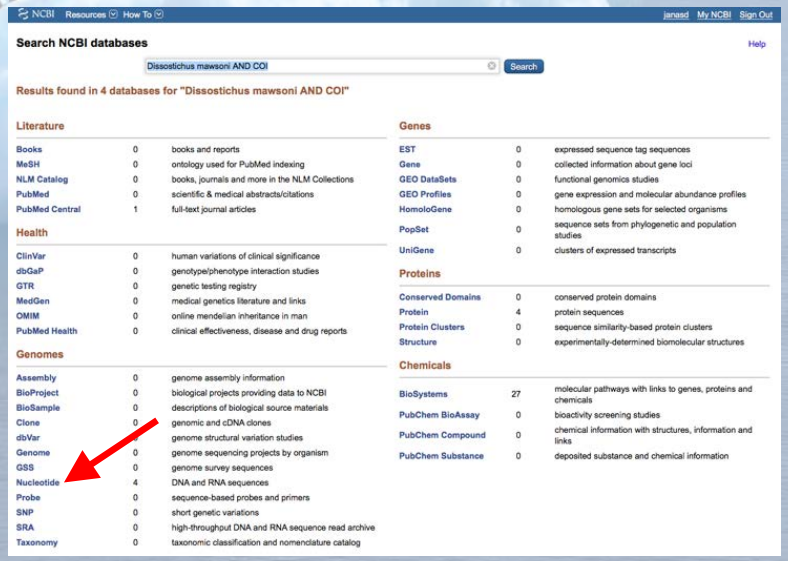
Antarctic cod fish: *Dissostichus mawsoni*

Material

- DNA-Sequences from NCBI: https://www.ncbi.nlm.nih.gov



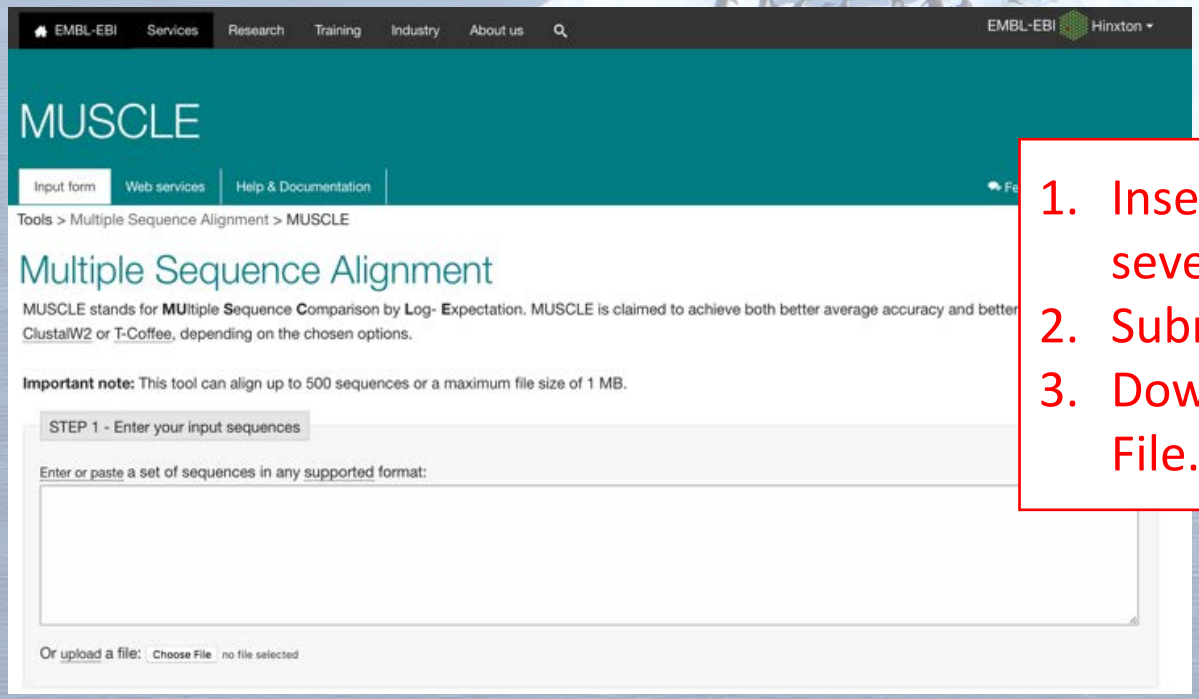
Species name AND COI



Create a FASTA file with several DNA sequences.

Methods

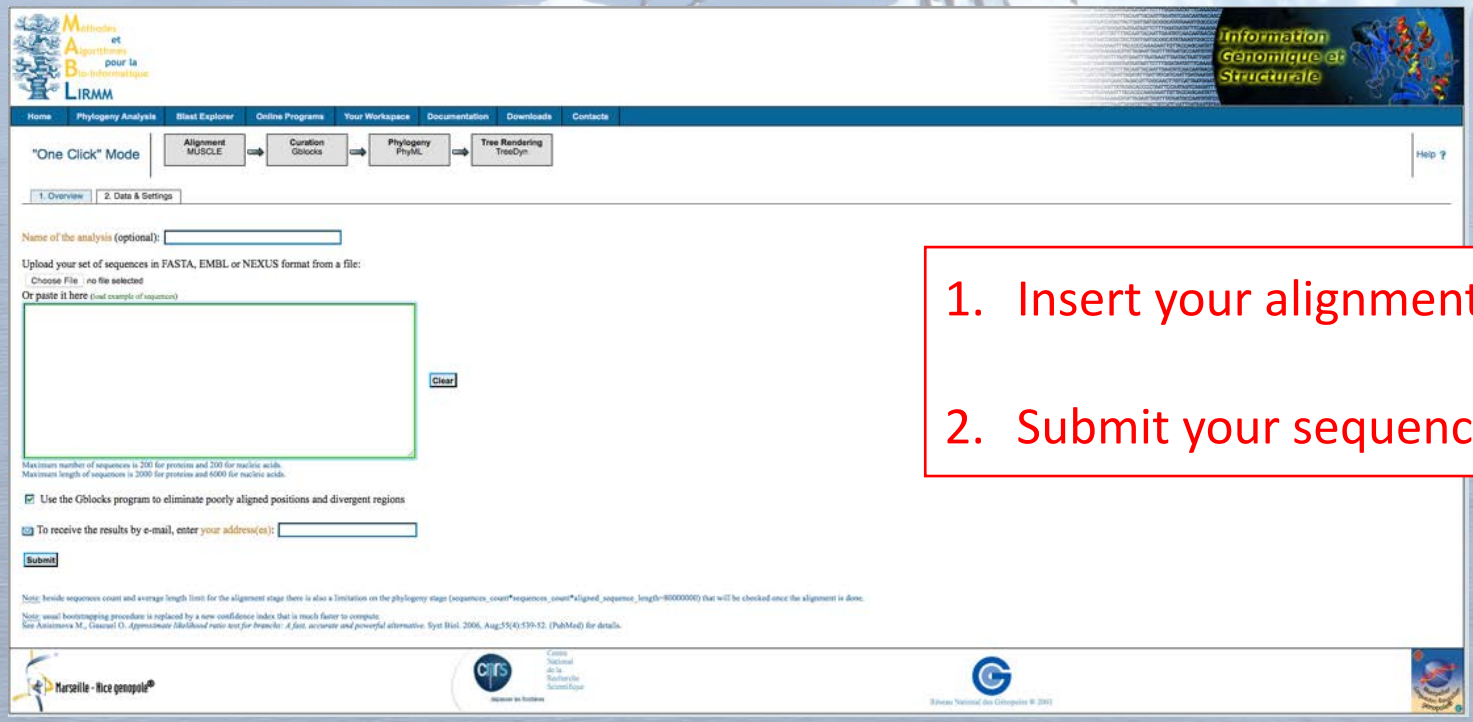
- Sequence alignment with MUSCLE: http://www.ebi.ac.uk/Tools/msa/muscle/



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

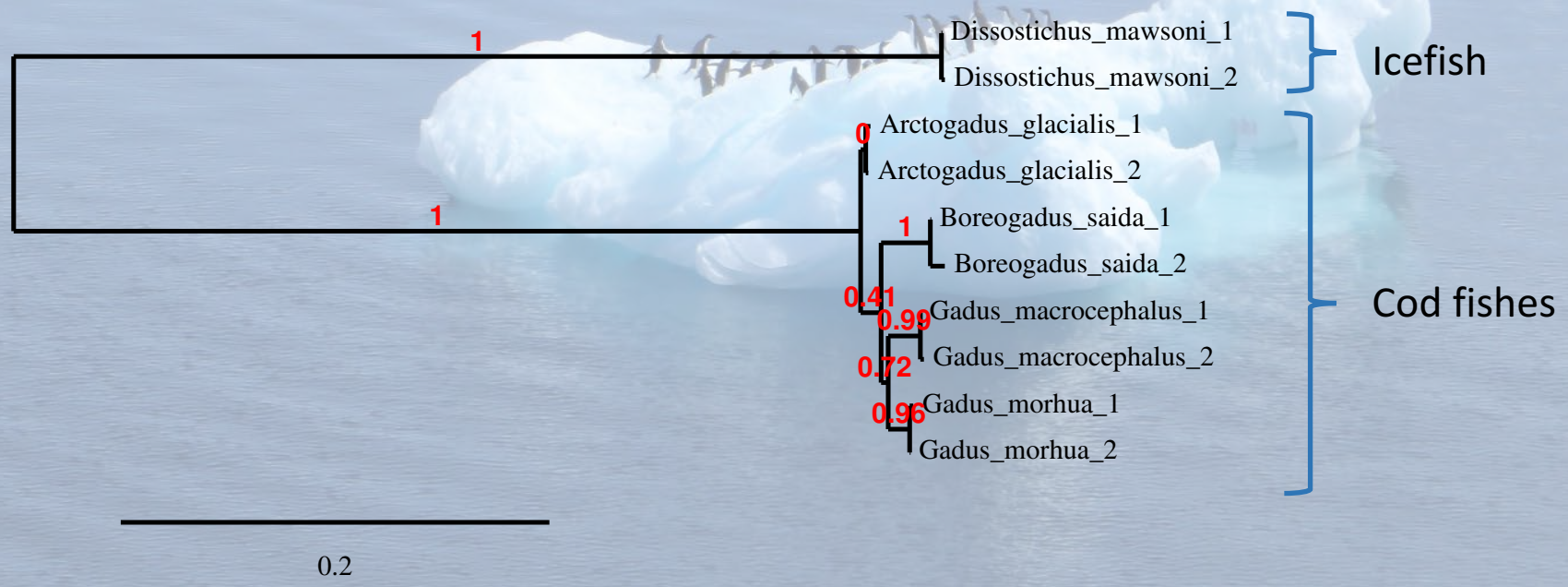
Methods

- Reconstruction of phylogenetic tree: http://www.phylogeny.fr/simple_phylogeny.cgi



1. Insert your alignment.
2. Submit your sequences.

Results and Discussion




Questions?
Suggestions?
Ideas?
Thank you!!!