WP2 ASSESSMENT AND CONSERVATION OF GENETIC RESOURCES FROM THE ENDANGERED SPECIES O. KARONGAE

SPECIES IDENTIFICATION BY GENETIC MARKERS & CONSERVATION BY CRYOTECHNOLOGIES

Fraunhofer EMB

Dr. Sebastian Rakers
25.09.2019

Background

- Genetic diversity is the key pillar of biodiversity and diversity within species, between species, and of ecosystems – however, **in Malawi the famous endemic "Chambo" – *Oreochromis karongae* is endangered and therefore, genetic diversity is at risk**

- Maintain genetic diversity at many levels and robustness of a species or population is expressed in terms of genetic variation – the **details of variation between different populations of *O. karongae* and other related families are largely unknown**

- **Recognize and quantify genetic diversity between individual or populations is very important**

Background – aims within WP2

1) Correlate genetic data to morphological characteristics and reproduction success

- Finding top top brood candidates→ **Characterization of strains**
  - Isolate DNA from O. karongae strains and identify populations (find genetic markers (QTL's) associated with different traits)

- Site specific strain performance (on-site)
  - Correlate environmental parameters to reproduction success

Fraunhofer EMB

Characterization of strains

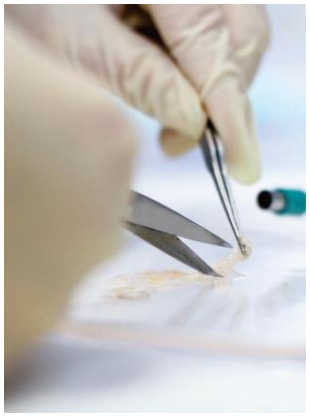
- When the top brood candidates are selected on this level, samples for DNA analysis are taken to find genetic markers (QTL's) associated with different traits.

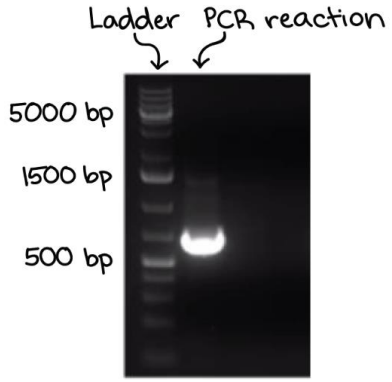
- For aquaculture purposes this means:
  - Population fitness; -survival and adaption of a species

  → get robust species
  - Selective breeding → get fast growing species

Find genetic markers (QTL's)

- Genomic DNA Isolation
- Polymerase chain reaction (PCR)
- Gel electrophoresis



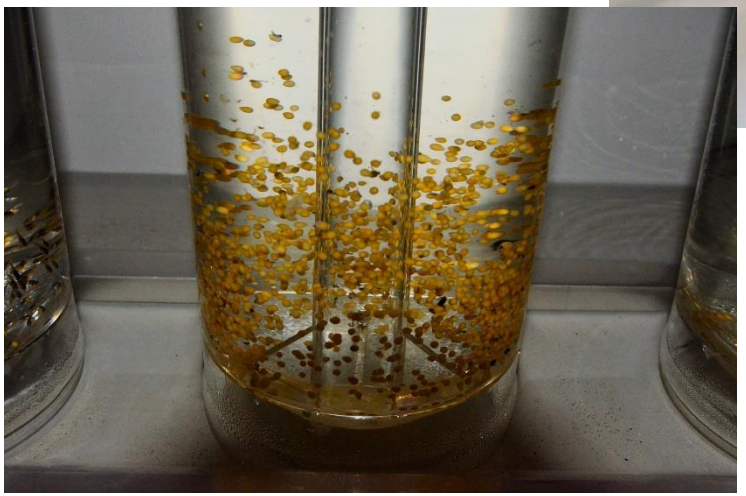


Get the markers responsible for growth, robustness, fecundity,…

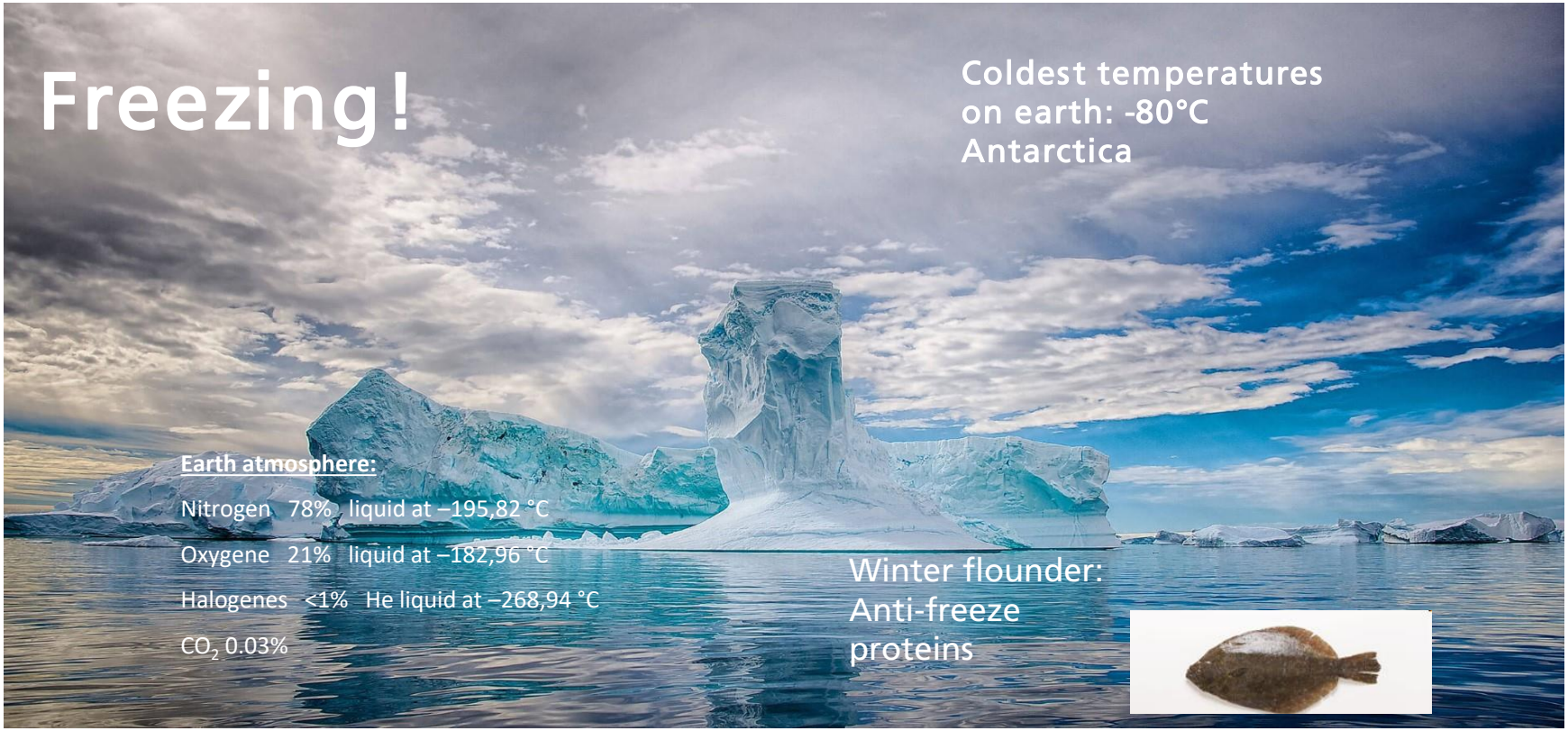
Background – aims within WP2

2) Preserving the genetic information of traits

- Optimize Cryoconservation protocols
  - Storage of sperm samples
  - Evaluate effects of temperature and feed on reproductive success



Preserving the genetic information of traits - Cryopreservation



Fraunhofer EMB

Cryobiology and aquaculture?

Management of reproduction

- ✓ Use of frozen sperm for handling routine in species with artificial fertilization
- ✓ Mating schemes independent of: maturation period, breeders availability, etc.
- ✓ Transport of gametes or embryos between farms instead of breeders
- ✓ Marketing of well-characterized and standard quality sperm

Genetic resource banking

- ✓ preservation of selected animals or stocks protected from outbreaks, catastrophes and genetic drift
- ✓ Preservation of biodiversity
- ✓ preservation of the genetics of valuable strains created for research or commercial production (polyploids, transgenics, etc)

Cryopreservation of Chambo – where are we?

Cryogenic preservation protocols for over 200 species achieved

There is no standard fish gamete cryopreservation protocol available

Started to test different protocols (e.g. Review protocols for the successful preservation of closely related species)

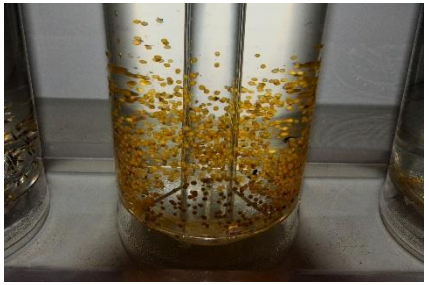
Fraunhofer EMB

Aim Cryopreservation Chambo

Define and have a "standard" protocol for cryogenic preservation of *O. karongae* ready and successfully tested

- ✓ Further adoption of technologies in Malawi and other African countries needed, challenges occur due to
  - ✓ Limited technical capacity,
  - ✓ Availability and supply of liquid nitrogen and
  - ✓ Power outages

- ✓ With cryopreservation technique, BUNDA has become a unique feature!



Fraunhofer EMB