

# The 'phenotype', the key to larval fish quality

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Opportunities for cooperation between  
ChinAquaNet and Ghent University  
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# What do “aquaculture” and “evolution” have in common?

## Evolution

- **natural** environment induces changes on the organism
- natural **selection** induces mortality or non-reproductivity
- only the fit ones are suitable for reproduction and guarantee survival of the **species**
- success of evolution is success of the **phenotype**

## Aquaculture

- **artificial** environment induces changes on the organism
- artificial and natural **selection** induce mortality or non-reproductivity
- only the fit ones are suitable for marketing and guarantee survival of an **enterprise**
- success of an enterprise is success of the **phenotype**

**relevant feedback for improving larval fish quality under rearing conditions has to come from the phenotype !!**

# What aspects of evolutionary studies can be applied for improving larval fish quality?

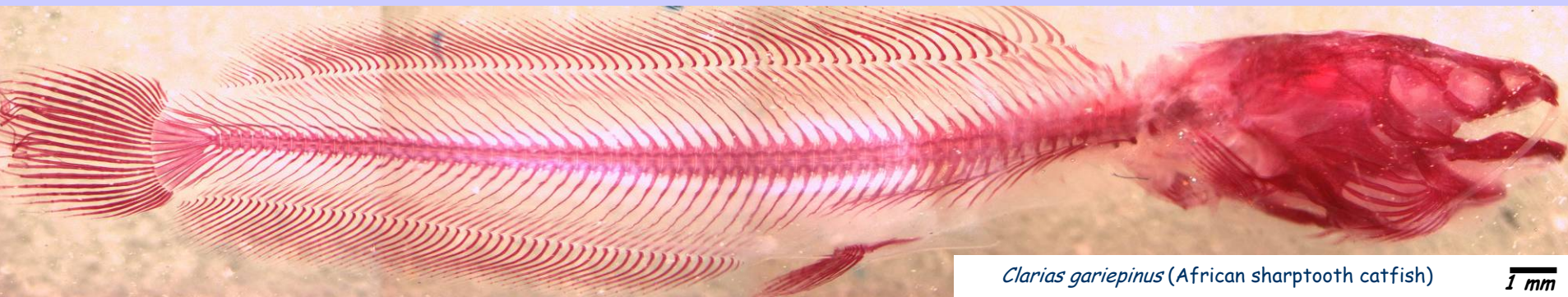
- Structure of organ systems susceptible to abnormalities

- gross morphology

- external morphology
  - non-invasive and fast screening of abnormalities
- musculo-skeletal system
  - head → impact of abnormalities high → high mortality
  - postcranial → can be survived → reduction in market value



(from Kane *et al.*, 1998)



*Clarias gariepinus* (African sharptooth catfish)

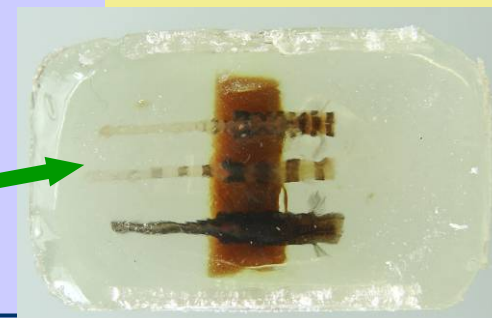
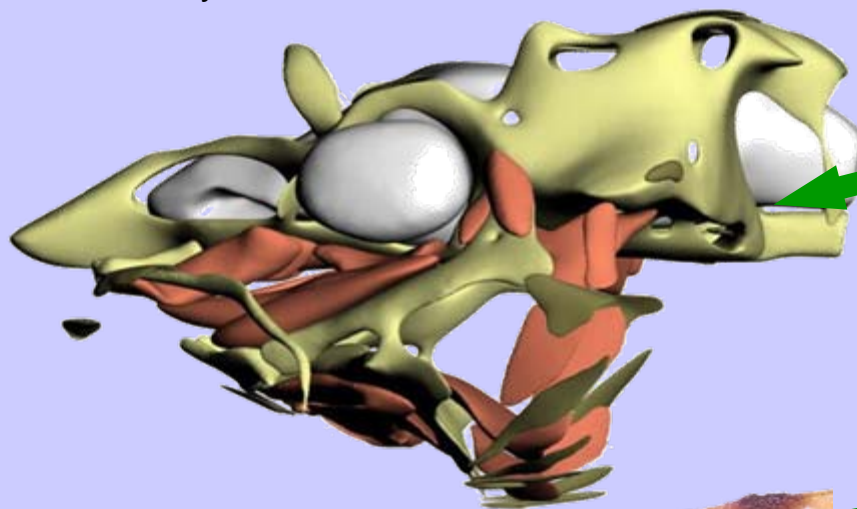
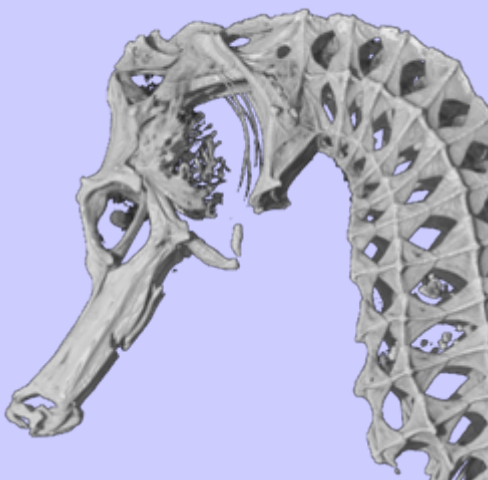
1 mm

# What aspects of evolutionary studies can be applied for improving larval fish quality?

- Structure of organ systems susceptible to abnormalities

- detailed anatomy

- use of serial sectioning, CT-scanning
- graphical 3D-reconstructing
  - study structure, shape and topography
  - hard and soft tissue systems

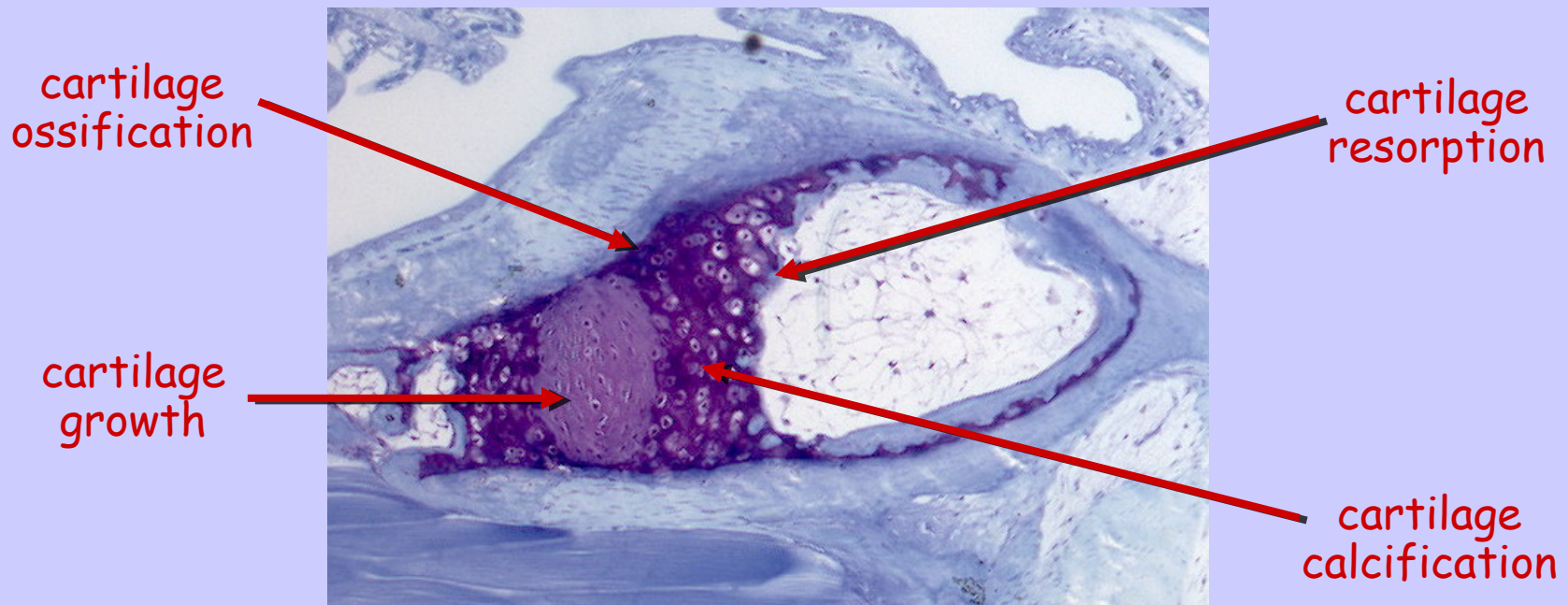


**e.g. feeding system !**



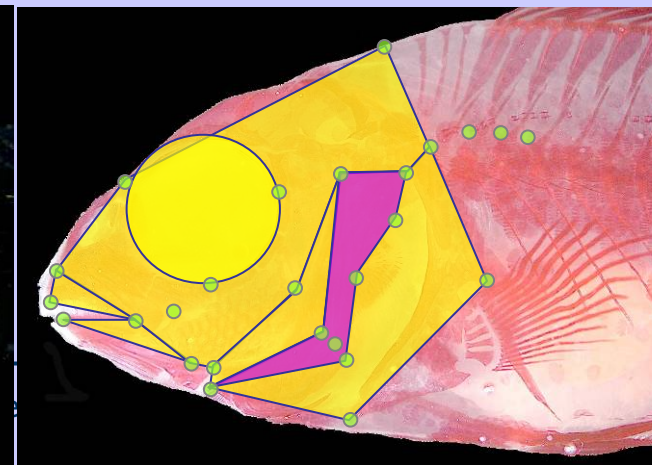
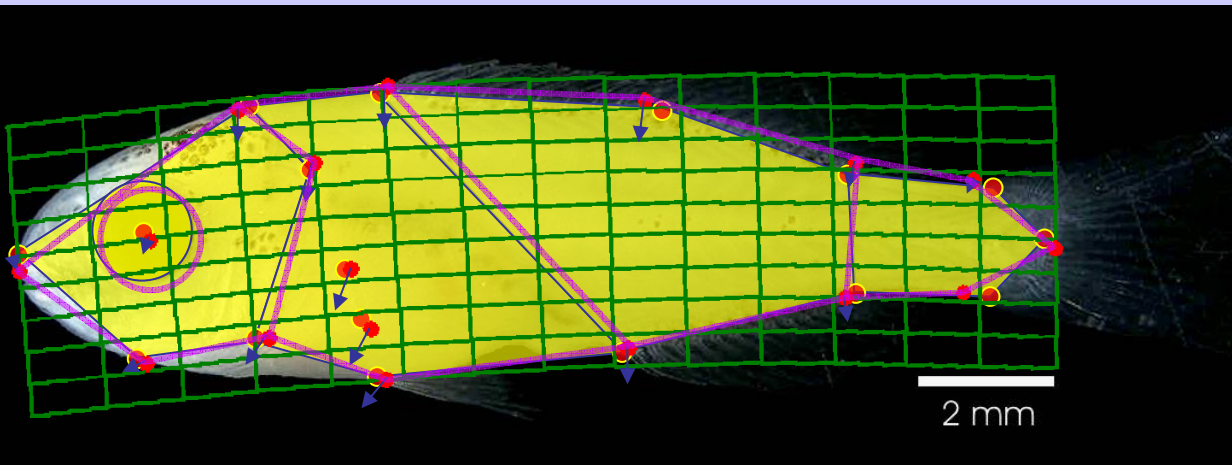
# What aspects of evolutionary studies can be applied for improving larval fish quality?

- Structure of organ systems susceptible to abnormalities
  - histology
    - at tissue-level
      - histogenetic indicators of abnormal tissue formation



# What aspects of evolutionary studies can be applied for improving larval fish quality?

- Shape analysis
  - quantitative and qualitative high-power analysis of shape variation
    - screening for aberrant shape patterns
    - geometric morphometrics
      - landmark based analyses
      - outline based analyses

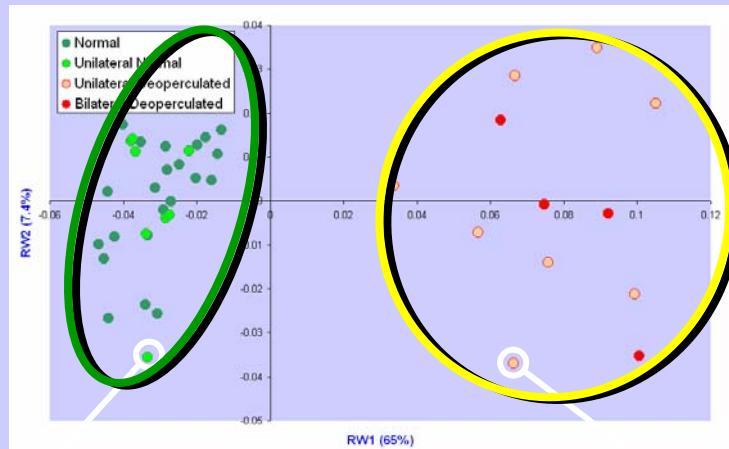


# Unilateral deoperculation in *Sparus aurata*

– Verhaegen *et al.* (2007) – *Aquaculture* 268: 156

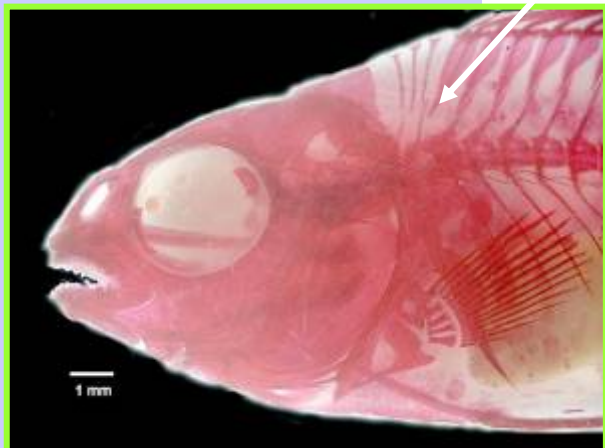
**NORMAL**

**DEOPERCULATED**



Left side

Right side



**Same specimen !**



# Opportunities for cooperation

- Expertise of studying larval fish phenotypes
  - qualitative analysis of larval fish quality
  - functional morphology analyses phenotype and performance
  - targeted screening for aberrant phenotypes
  - improving rearing protocols using phenotype as signal of larval quality