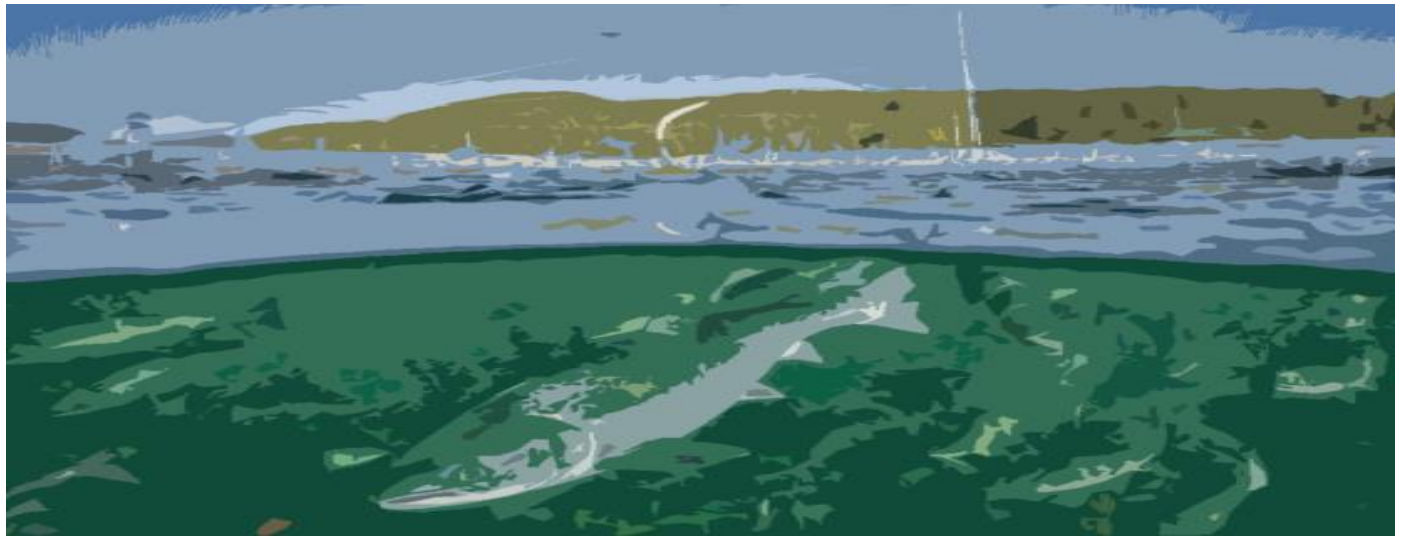
Istituto Zooprofilattico Sperimentale
dell'Umbria e delle Marche "Togo Rosati"



Main bacterial diseases of freshwater species

Dr. Francesco Agnetti
IZSUM

II Webinar of the WOAH National Focal Points for Aquatic Animals in Europe
5th December 2024

Content of the presentation

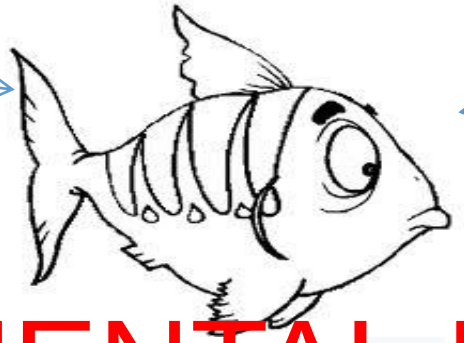
- overview of the main bacterial diseases of freshwater fish species
  - clinical and anatomo-pathological features
  - some diagnostic tools

- European (Mediterranean area) context

- Salmonids (trout) and Ciprinids

Water:

T°
O_2
pH
salinity
origin
dissolved substances



Feed:

quantity
quality
typology

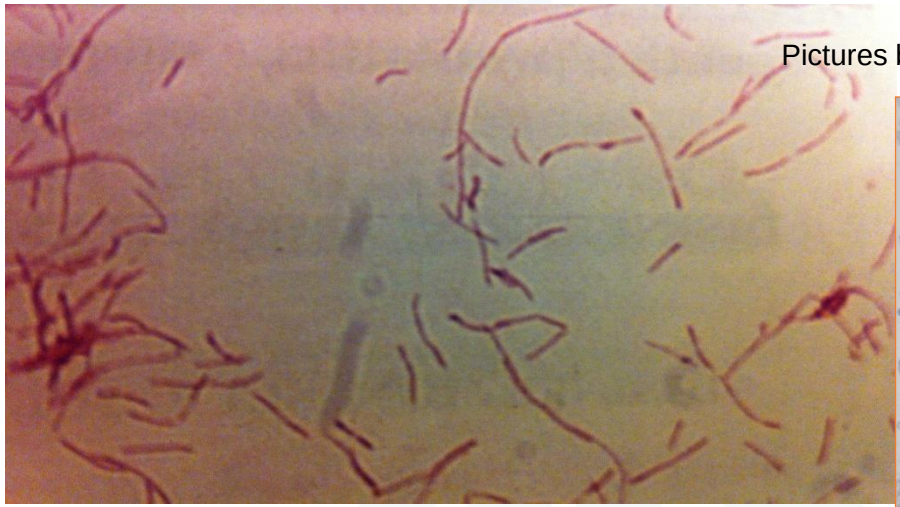
ENVIRONMENTAL PRESSION

Farm management:

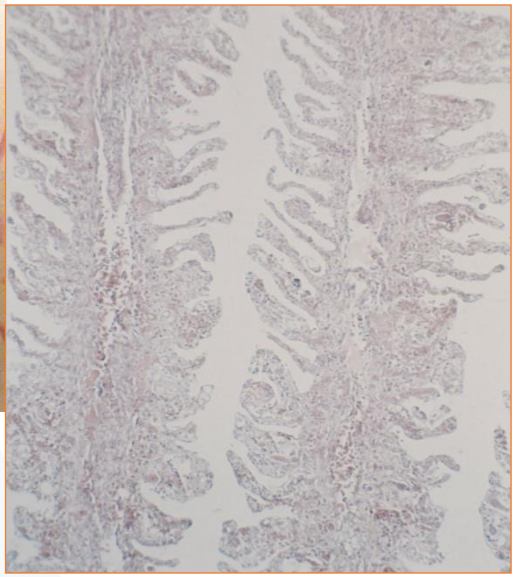
high density in tanks
maintenance
cleaning/disinfection
genetic selection
therapy and/or prophylaxsis
unwanted animals (i.e. birds)

Bacterial Gill Disease

From C. Ghittino, in Troticoltura moderna, 2003



Pictures by F. Agnetti, 2010



Flavobacterium branchiophilum

- Large filamentous Gram negative rods

- multifactorial syndrome determined by bacteria in conjunction with predisposing factors, such as T° , O_2, poor tank hygiene, etc.
- fry and juveniles are most affected

Cutaneous Flavobacteriosis

From C. Ghittino, in Troticoltura moderna, 2003

Flavobacterium psycrophilum

- “rainbow trout fry syndrome”
- multifactorial syndrome determined by bacteria in conjunction with predisposing factors, such as high density, poor tank hygiene, water T° below 15° C
- erosion of the peduncle area, ulcers on scales, leads to penetration into tissues; characteristic «saddle» skin lesions due to erosion phenomena, complicated by sun exposure (sun burn disease)
- fry and juveniles are most affected

BACTERIAL SEPTICEMIAS

Gram negative rods

- Yersiniosis or Red Mouth Disease
- Furunculosis
- Vibriosis
- *Aeromonas* spp. infections

Gram positive cocci

- Lactococcosis (G+)
- Vagococcosis (G+)

Pictures by F. Agnetti, 2010

Photo from the web,, 2022

Adult fish are most involved in these episodes

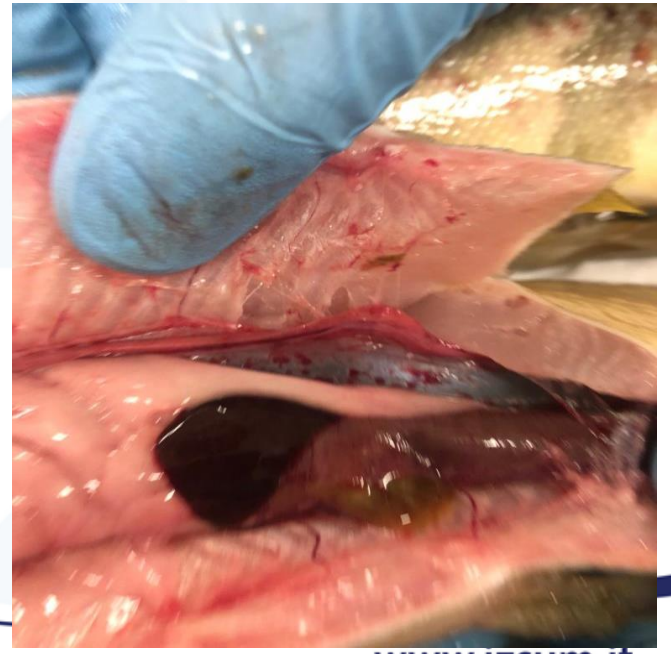
YERSIONIOSIS OR RED MOUTH DISEASE

From C. Ghittino, in Troticoltura moderna, 2003

Pictures by F. Agnetti, 2022

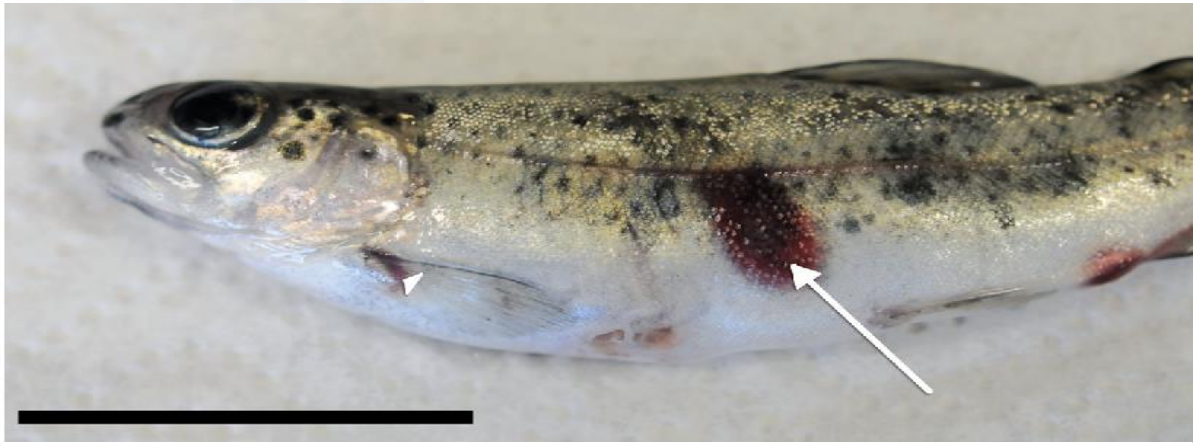
Yersinia ruckeri

- septicemic infection with an acute course, characterized by haemorrhagic diathesis
- it can occur at temperatures both below and above 12° C
- non-specific symptoms, such as lethargy, anorexia, melanosis, exophthalmos
- tongue and palate haemorrhages, gills anemia, skin haemorrhages, liver and swim bladder haemorrhages, enlargement of the spleen, haemorrhagic enteritis



FURUNCULOSIS

From C. Ghittino, in Troticoltura moderna, 2003



From Menanteau-Ledouble et al., 2016

Aeromonas salmonicida subsp*. salmonicida*

- septicemic infection with an acute course, characterized by haemorrhagic diathesis
- it can occur at temperatures both below and above 12° C
- non-specific symptoms, such as lethargy, anorexia, melanosis, exophthalmos
- presence of characteristic swellings that if engraved show a red-blackish liquid material

VIBRIOSIS

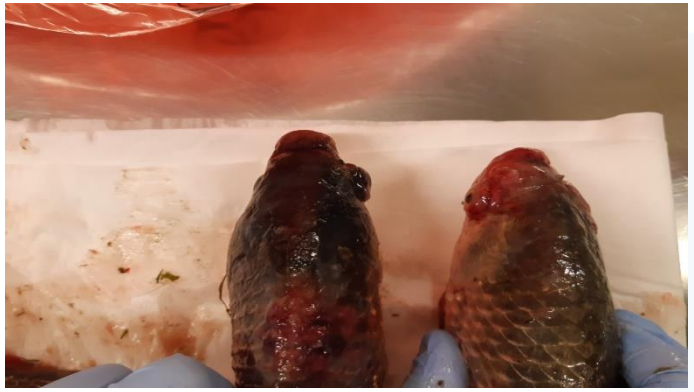
From http://bioweb.uwlax.edu/bio203/f2013/voye_rach/interactions.htm

From C. Ghittino, in Troticoltura moderna, 2003

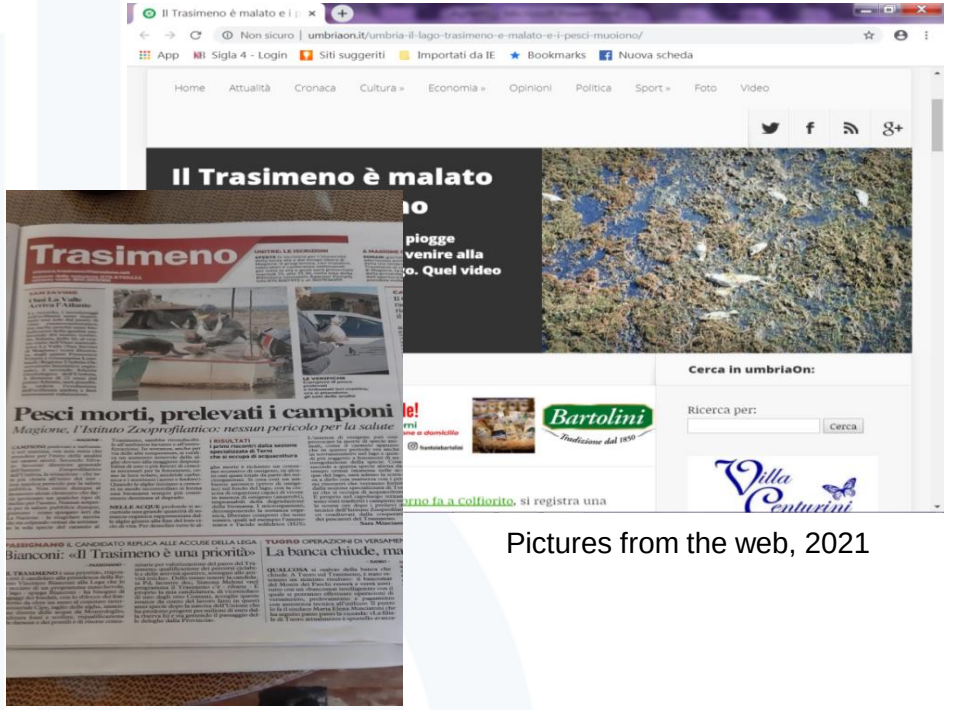
Vibrio anguillarum, Vibrio salmonicida

- septicemic infection with an acute course, characterized by haemorrhagic diathesis
- more frequent in summer, with a temperature above 12° C
- non-specific symptoms, such as lethargy, anorexia, melanosis, exophthalmos
- haemorrhages in the pectoral and abdominal fins, redness and anal protrusion, liver and swim bladder haemorrhages, enlargement of the spleen,

AEROMONAS INFECTIONS



Pictures by F. Agnetti, 2021



Pictures from the web, 2021

Aeromonas hydrophila, Aeromonas sobria

- septicemic infection with an acute course, characterized by haemorrhagic diathesis
- more frequent in summer, with a temperature above 12° C
- frequent episodes especially in lakes with shallow water, poor water exchange, low rainfall and presence of algal blooms
- non-specific symptoms, such as lethargy, anorexia, melanosis, exophthalmos
- haemorrhages in the pectoral and abdominal fins, redness and anal protrusion, liver and swim bladder haemorrhages, enlargement of the spleen,

STREPTOCOCCOSIS

Warm water T° >15° C

Cold water T° <15° C

LACTOCOCCOSIS

Lactococcus garvieae

- septicemic infection with an acute course, characterized by haemorrhagic diathesis
- mortality of 30-50%
- non-specific symptoms, such as lethargy, anorexia, melanosis, bilateral exophthalmos
- ophthalmitis, gill anemia, redness and anal protrusion, liver and swim bladder haemorrhages, enlargement of the spleen, haemorragic enteritis, meningitis

VAGOCOCCOSIS

Vagococcus salmoninarum

- septicemic infection with a chronic course
- mortality of 15-20%
- non-specific symptoms, such as lethargy, anorexia, melanosis, bilateral or monolateral exophthalmos with rupture of the eyeball
- ophthalmitis, gill anemia, redness and anal protrusion, liver and swim bladder haemorrhages, enlargement of the spleen, haemorragic enteritis, meningitis

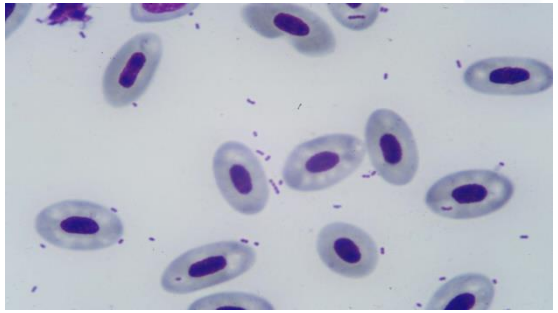
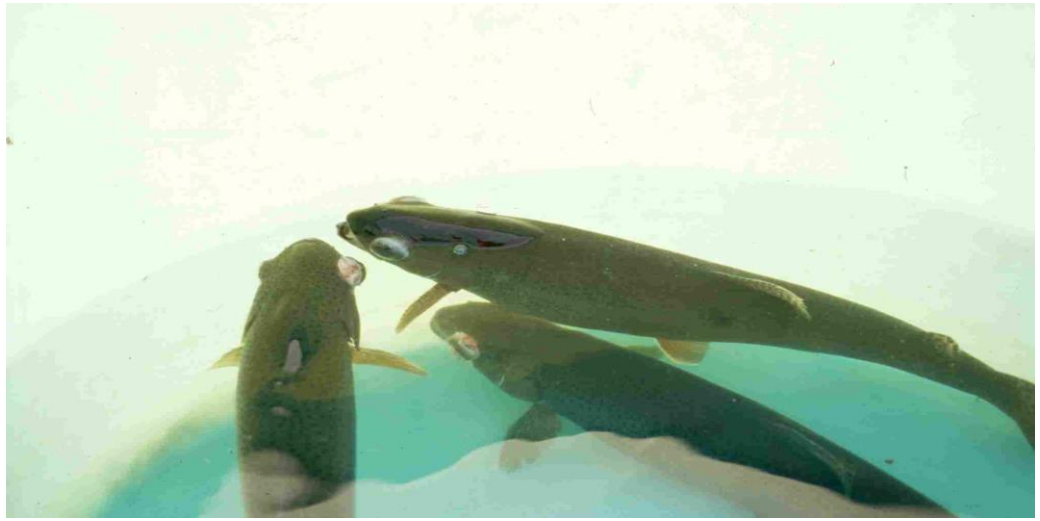
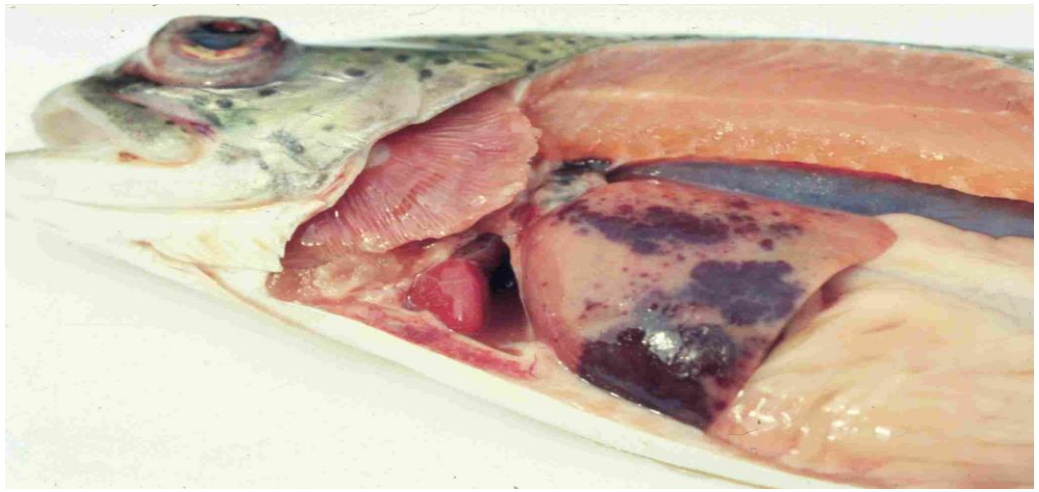


Photo by F. Agnetti, 2003

LACTOCOCCOSIS





From C. Ghittino, in Troticoltura moderna, 2003

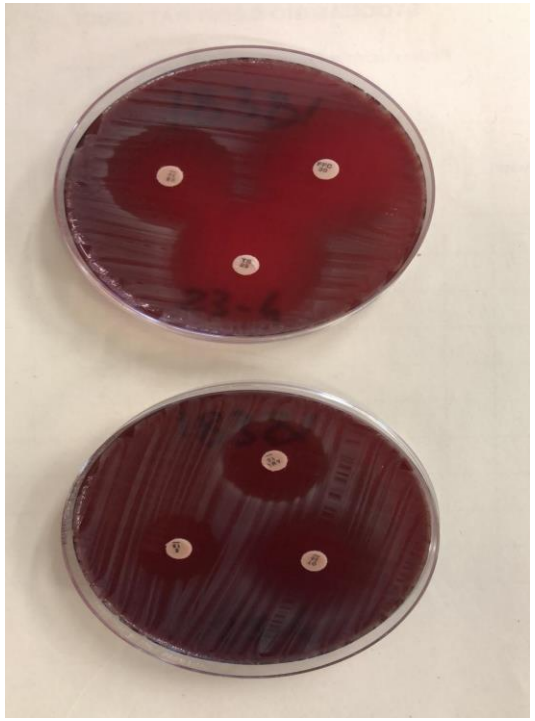
VAGOCOCCOSIS

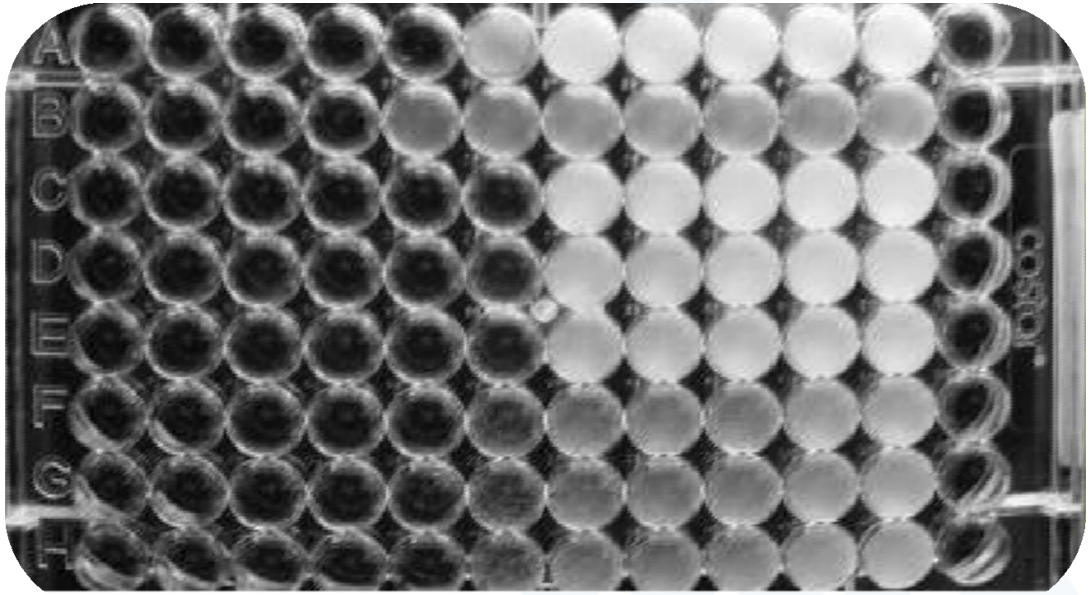
From C. Ghittino, in Troticoltura moderna, 2003

From Ozcan et al., 2016

BACTERIAL SEPTICEMIAS - DIAGNOSIS

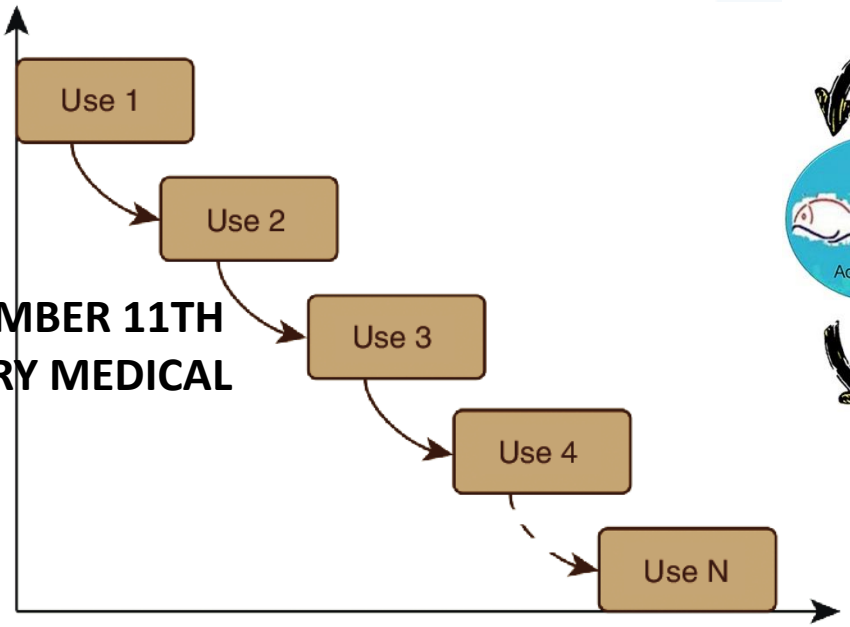
- **Target organs/tissues**: spleen, kidney, brain, gills, mucus, eye
- **Culture features:** BA, TSA incubated at 22-25°T for 24-48h (more than 48h in some cases), hemolysis Y/N, size and color of the colonies, pigment Y/N
- **Biochemical features**: Gram stain, aerobic or anaerobic activity, motility Y/N, oxidase and catalase, carbohydrate fermentation activity (API systems)
- **MALDI-TOF**
- **Molecular biology and sequencing**
- **Antimicrobic sensitivity tests:** Kirby-Bauer and MIC assay.





Pictures by F. Agnetti, 2020

EU REGULATION 2019/6 (DECEMBER 11TH 2018), RELATING TO VETERINARY MEDICAL PRODUCTS

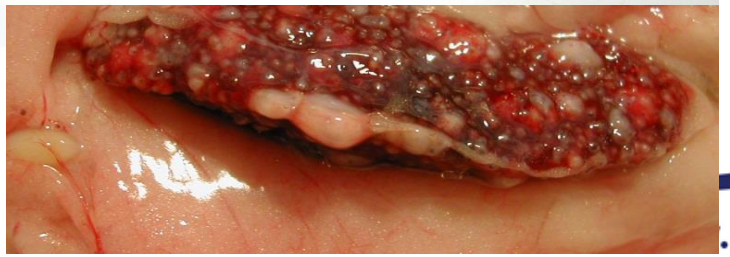


From https://www.sciencedirect.com/science/article/pii/S0269749117300167

FISH MYCOBACTERIOSIS OR TUBERCULOSIS

- Also known as “atypical mycobacteriosis”, caused by *M. chelonae*, *M. marinum*, *M. fortuitum* and others, all not belonging to the *tuberculosis*-complex
- systemic diseases generally with a chronic course, described in many farmed fish species
- worldwide diffusion
- mainly observed in ornamental fish, both farmed and imported
- also reported in Europe in both caught and farmed sea bass
- considered non-food fish zoonoses or contact fish zoonoses

Photo by M. Prearo, IZSTO, 2001



Pictures by F. Agnetti, 2005

FISH MYCOBACTERIOSIS OR TUBERCULOSIS



Pictures from the web

- The infection is contracted through the contact of an area of abraded skin with water contaminated by the microorganism
- it can be found not only in aquariums but also in swimming pool water
- the limbs are usually affected (in the aquarium forms especially the hands following trauma in cleaning these structures, for example)
- the lesions are generally only cutaneous and consist of single or multiple nodules, sometimes with a warty surface; lymphatic involvement is however possible
- health risk especially for breeders, veterinarians and aquarists


Thanks for your attention!
f.agnetti@izsum.it