Pathological Changes Observed in European Amphibians with Ranaviral Diseases

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Presentation contributors

• Amanda Duffus, Gordon College
• Amber Teacher, University of Helsinki
Ranavirus in Europe

Outbreaks

Spain (Balseiro et al., 2009; 2010)
United Kingdom (Cunningham et al., 1997; 2007)
The Netherlands (Rijke et al., 2011)
Belgium (Pasmans et al., 2008)
Denmark (Ariel et al., 2008)
Croatia (Fijan et al., 1991)

Mass mortalities in Europe

- Croatia:
  - Since 1970
  - Smooth concrete tank
  - Wild edible frogs (Pelophylax kl. esculentus)
  - *Rana esculenta* iridovirus (REIR)

April Design
Mass mortalities in Europe

England
(Cunningham et al., 1997; 2007)
- South East of England:
  - Since 1985
  - Ponds
  - Common frog (Rana temporaria), Common newt (Triturus vulgaris),
  - Ranavirus United Kingdom (RUK)

Denmark
(Ariel et al., 2009)
- Slagelse:
  - 2008
  - Shallow artificial pond
  - Wild edible frogs (Pelophylax esculentus)
  - Pelophylax esculentus Virus (PEV DK-1 / PEV DK-2)
<table>
<thead>
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<th>Mass mortalities in Europe</th>
<th>Spain (Balseiro et al., 2009)</th>
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<td>Picos Europa National Park (1st outbreak):</td>
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<td>- 2007</td>
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<td>- Permanent water trough</td>
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<td>- Tadpoles of the Common midwife toad (<em>Alytes obstetricans</em>)</td>
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Spain (Balseiro et al., 2009) - Mass mortalities in Europe

Mass mortalities in Europe

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<td>- Tadpoles of the CMT (<em>Alytes obstetricans</em>) / Juveniles of alpine newt (<em>Ichthyosaura alpestris</em>)</td>
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Mass mortalities in Europe

The Netherlands
(Rijks et al., 2011)

- Dwingelderveld Park:
  - 2010
  - Shallow artificial pond
  - Edible frog and pool frog (Pelophylax spp) and newts (Triturus cristatus and Lissotriton vulgaris)
  - Common Midwife Toad Virus (CMTV)

Mortalities in Europe

Belgium
(Pasmans et al., 2008)

- Belgium:
  - 2004
  - Pet shop
  - Red tailed knobby newts (Tylototriton kweichowensis)
  - Frog virus-3 (FV3)
Pathology

TWO MAIN SYNDROMES:

- Ulcerative skin syndrome (CHRONIC)
  - Adults and tadpoles – England and Belgium
  - No obvious internal lesions

- Haemorrhagic systemic syndrome (ACUTE)
  - Tadpoles and juveniles - Spain
  - Adults, tadpoles and juveniles - England, Croatia and The Netherlands
  - Haemorrhages in most internal organs

- Ulcerative and haemorrhagic syndrome - England
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<td><img src="image1.png" alt="Image 1" /></td>
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<td><img src="image3.png" alt="Image 3" /></td>
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A. Teacher
A. Duffus
**Macrosopic lesions**

**Ulcerative syndrome**

**Pathology**

**Macroscopic lesions**

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Macroscopic lesions | Haemorrhagic syndrome
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Haemorrhagic syndrome

Macroscopic lesions

Haemorrhagic syndrome
Macroscopic lesions

Haemorrhagic syndrome

[Image of a frog with macroscopic lesions]

Macroscopic lesions

Haemorrhagic syndrome

[Image of a frog with internal lesions]
**Macroscopic lesions**

**Haemorrhagic syndrome**

- Skeletal muscle: haemorrhages / degeneration
- Skin: Epidermal thickening / necrosis of the deeper layers
- Foci of necrosis
- Intracytoplasmic viral inclusions
- Pyknotic nuclei

*Also demonstrated by immunohistochemistry*

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**Pathology**

**Microscopic lesions**

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- *Spleen
- *Liver
- *Kidney
- *Intestine
- *Pancreas*
**Pathology**

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*Also demonstrated by immunohistochemistry*

Liver, PAP Anti-Ranavirus 200x
Healthy adult amphibians from Spain-positive immunolabelling!!

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<th>Newts-Ganglia</th>
<th>Toads-Kidneys</th>
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POSSIBLE RESERVOIRS??

THANK YOU FOR YOUR ATTENTION!
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