


Eel rhabdoviruses: how many viruses, how many strains?

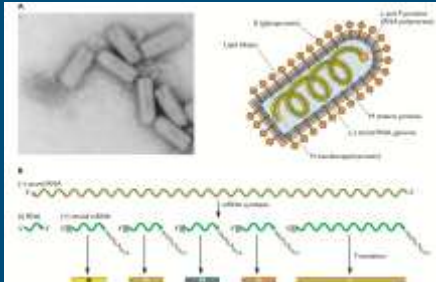
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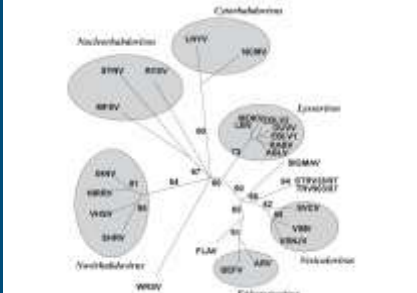
Introduction to the family *Rhabdoviridae*



Fint *et al.*, 2nd ed., 2004

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Introduction to the family *Rhabdoviridae*



Hoffmann *et al.*, 2005

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Eel rhabdoviruses – Why do we care?

- Eel rhabdoviruses are widespread in farmed and wild European eel (van Ginneken, 2004)
- Eel rhabdoviruses may cause a hemorrhagic disease and significant mortality in farmed European eel
- Eel rhabdoviruses have been suggested as one of the major causes of the European eel population decline (van Ginneken, 2005)



van Ginneken, 2005

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Eel rhabdoviruses – What is the problem?

- Currently, several eel rhabdovirus isolates have been described
- The confusion about the classification of eel rhabdoviruses leads to:
 - Taxonomic ambiguity
 - Diagnostic difficulties
- How many viruses, how many strains?
 - EVEX vs. EVA
 - Rhabdoviral dermatitis
 - Gastric isolates

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1. EVEX vs. EVA – First description

- Eel virus American* (EVA)
- Eel virus European X* (EVEX)




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1. EVEX vs. EVA – Morphology / Infectivity



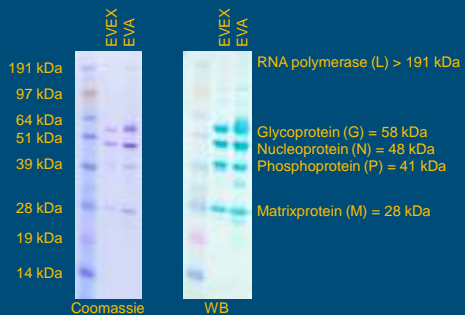
- Morphologically very similar
- CPE caused in RTG-2 very similar
- Pathogenic to rainbow trout, especially at higher temperatures

1. EVEX vs. EVA – Serology



- Morphologically very similar
- CPE caused in RTG-2 very similar
- Pathogenic to rainbow trout, especially at higher temperatures
- Serologically very similar (and distinct from VHSV / IHNV)
- Biochemical very similar (and distinct from VHSV / SVCV / VSV)

1. EVEX vs. EVA – Structural proteins




191 kDa
97 kDa
64 kDa
51 kDa
39 kDa
28 kDa
19 kDa
14 kDa

EVEX EVA
Coomassie WB

RNA polymerase (L) > 191 kDa
Glycoprotein (G) = 58 kDa
Nucleoprotein (N) = 48 kDa
Phosphoprotein (P) = 41 kDa
Matrixprotein (M) = 28 kDa

1. EVEX vs. EVA – Gene sequences



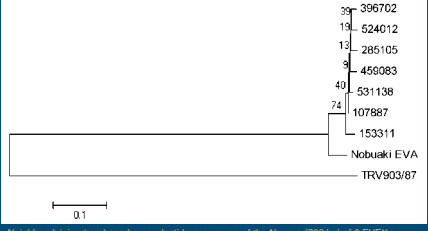
- Comparison of partial RNA polymerase (L) gene sequences (2040 bp) showed 91.5% sequence identity between EVEX and EVA

1. EVEX vs. EVA – Gene junctions

Virus	Gene junction G and L gene
<i>Vesiculovirus</i>	TGATATGAAAAAAAACTA-T-AACAGACATCANGTTGA
<i>Spring viraemia of carp virus</i>	ATATGAAAAAAAAACAGCT-AACAGGCATCANGCTTA
<i>Trout rhabdovirus</i>	TATATGAAAAAAAACTATTC-AACAGACATCANGTANGA
<i>Eel virus European X</i>	TTTATGAAAAAAAAA---T-AACAGCAATCANGGAAGT
<i>Vesicular stomatitis Indiana virus</i>	
<i>Ephemerovirus</i>	
<i>Adelaide River virus</i>	CACATGAAAAAAAACATGGAGCTTTTGATGAAATCTA

- Based on the gene junctions (potential stop and start sequences), EVEX belongs to the genus *Vesiculovirus*

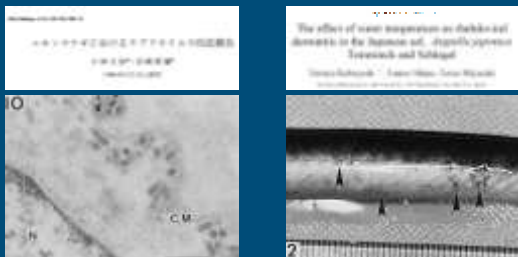
1. EVEX vs. EVA – Taxonomy



- Based on phylogenetic analysis of the N-gene, EVEX and EVA can be considered as two strains of a single virus species

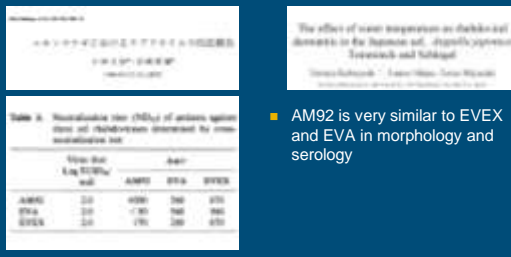
2. Rhabdoviral dermatitis – First description

- Rhabdoviral dermatitis of Japanese eel (AM92)



2. Rhabdoviral dermatitis – Serology

- Rhabdoviral dermatitis of Japanese eel (AM92)

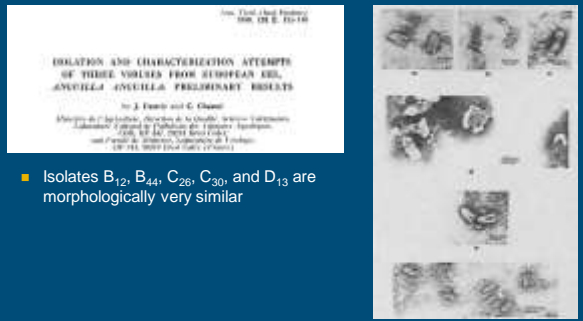


- AM92 is very similar to EVEV and EVA in morphology and serology

3. Castric isolates – First description

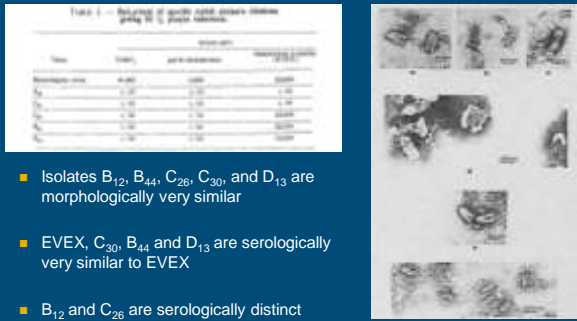


3. Castric isolates – First description



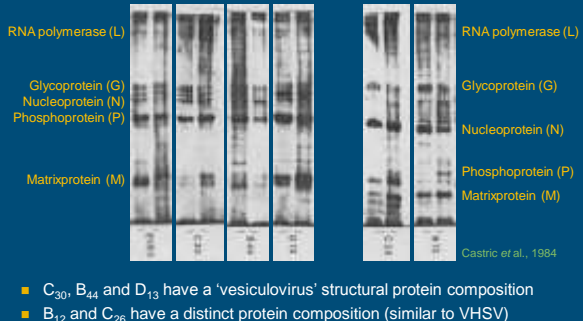
- Isolates B₁₂, B₄₄, C₂₆, C₃₀, and D₁₃ are morphologically very similar

3. Castric isolates – First description



- Isolates B₁₂, B₄₄, C₂₆, C₃₀, and D₁₃ are morphologically very similar
- EVEV, C₃₀, B₄₄ and D₁₃ are serologically very similar to EVEV
- B₁₂ and C₂₆ are serologically distinct

3. Castric isolates – Structural proteins



- C₃₀, B₄₄ and D₁₃ have a 'vesiculovirus' structural protein composition
- B₁₂ and C₂₆ have a distinct protein composition (similar to VHSV)

Summary

- Rhabdoviruses can be important pathogens in wild and farmed freshwater eels of the genus *Anguilla*
- EVEX, EVA and rhabdoviral dermatitis of Japanese eel are probably three strains of one eel vesiculovirus
- Castric isolates C₃₀, B₄₄ and D₁₃ are different isolates of the EVEX strain of eel vesiculovirus
- B₁₂ and C₂₆ are most likely eel novirhabdoviruses
- Current research focuses on complete genome sequencing of EVEX, in order to confirm its taxonomic position within the genus *Vesiculovirus*

Acknowledgements



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