

EPIZOTIC ULCERATIVE SYNDROME

K.D.A. HUCHZERMEYER
Sterkspruit Veterinary Clinic, Lydenburg South Africa
B.C.W. van der Waal
University of Venda



Photo O. Weyl

Aphanomyces invadans

- Primary fish pathogen
- An invasive aquatic oomycete or water mould
- Belonging to the Straminopiles
- Distinct from other saprophytic water moulds

Saprophytic water moulds

- May result in non-invasive opportunistic infections of surface lesions on fish



- *Saprolegnia*, *Achlya* and other *Aphanomyces* species



Castlebar News

Crayfish plague

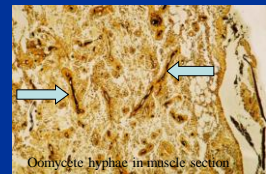
- Oomycete or water mould – *Aphanomyces astaci*
- Native North American signal crayfish is resistant to crayfish plague
- Crayfish plague was introduced to Europe from 1870 – 1940 devastating European fresh water crayfish populations. From 1960's to 2000 active stocking of signal crayfish was the main route of spread of crayfish plague
- devastation of remaining indigenous European crayfish populations

Geographic distribution

- First described from Japan in 1971 and Australia 1972.
- Philippines and other east Asian countries
- India
- In estuarine fish along the Atlantic coast of USA since early 1980s
- Botswana and Namibia 2006
- South Africa 2011
- Canada 2011

EUS

- Initial red areas on surface of fish
- Later ulceration and liquefaction of muscles tissues
- **Little host specificity**
- Affecting both fresh and estuarine warm water fish.




Oomycete hyphae in muscle section



B. Van der Waal

Epizootic Ulcerative Syndrome (EUS)



- A disease exotic to Africa.
- First cases reported from upper Zambezi and Chobe rivers in 2006
- Diagnosis confirmed in 2007
- Botswana, Namibia, Zambia and Zimbabwe affected
- Major threat to aquaculture development and export potential



Fungus hyphae in muscle section

Spread is through the water by means of zoospores




Labeo lunatus Chobe River, Botswana 2007

Breach of skin barrier needed for infective zoospores to enter tissues of fish



Petrocephalus catostoma

At the site of infection raised red areas initially appear on the surface of the fish



Labeo lunatus Chobe River, Botswana 2007

Tissue necrosis in early lesions is associated with an intense inflammatory reaction



R. Bills

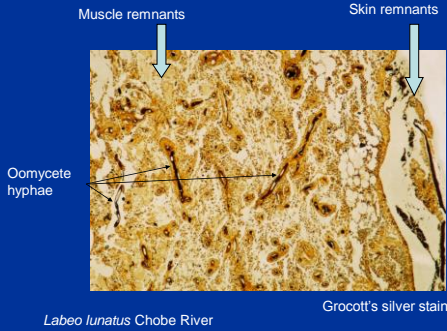
Barbus poechari Okavango Delta

Hyphae invade skin and muscle causing focal necrotising granulomatous dermatitis and myositis

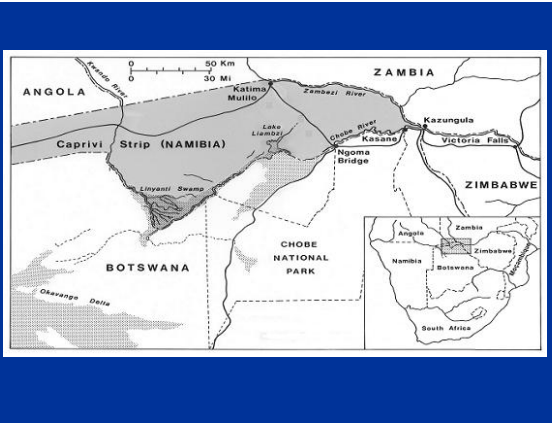
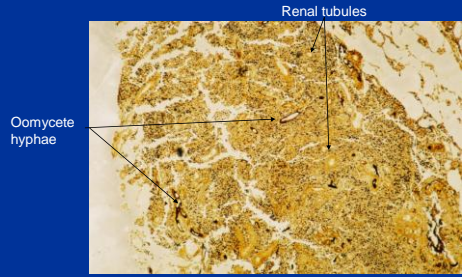


Labeo lunatus Chobe River, Botswana 2007

Aphanomyces hyphae in necrotic muscle – histopathological picture



Deeply penetrating *Aphanomyces* hyphae within kidney



| <i>Marcusenius macrolepidotus</i> | |
|-------------------------------------|-----------------------|
| <i>Petrocephalus catostoma</i> | northern bulldog |
| <i>Brycinus lateralis</i> | Churchill |
| <i>Micralestes acutidens</i> | striped robber |
| <i>Hydrocyus vittatus</i> | silver robber |
| <i>Hepsetus odoe</i> | tigerfish |
| <i>Barbus poechii</i> | African pike |
| <i>Barbus paludinosus</i> | dashtail barb |
| <i>Barbus unilaeniatus</i> | straightfin barb |
| <i>Barbus unilaeniatus</i> | longbeard barb |
| <i>Labeo lunatus</i> | Upper-Zambezi labeo |
| <i>Labeo cylindricus</i> | redeye labeo |
| <i>Clarias ganepinus</i> | sharptooth catfish |
| <i>Clarias ngamensis</i> | bluntnose catfish |
| <i>Schilbe intermedius</i> | silver catfish |
| <i>Tilapia sparmanii</i> | banded tilapia |
| <i>Tilapia rendalli</i> | redbreast tilapia |
| <i>Oreochromis andersonii</i> | threespot tilapia |
| <i>Oreochromis macrochir</i> | greenhead tilapia |
| <i>Pharyngochromis acuticeps</i> | Zambezi River bream |
| <i>Serranochromis robustus</i> | nembwe |
| <i>Serranochromis angusticeps</i> | thinface largemouth |
| <i>Serranochromis macrocephalus</i> | purpleface largemouth |
| <i>Sargochromis codringtonii</i> | green bream |
| <i>Sargochromis giardi</i> | pink bream |

Deep ulceration typical of an advanced lesion of EUS



Intense inflammation accompanying a progressing lesion



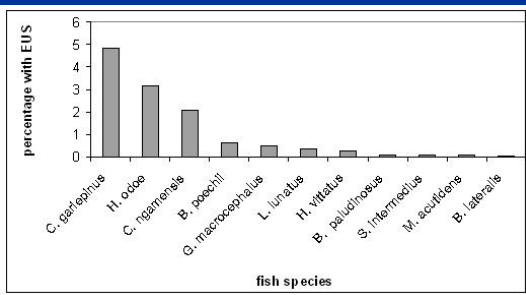
Hydrocynus vittatus Okavango Delta

A. invadans shows little host specificity

- The floodplains at the Chobe Zambezi confluence are home to around 80 different species of fish
- By 2008 reported from 22 species of fish in the upper Zambezi



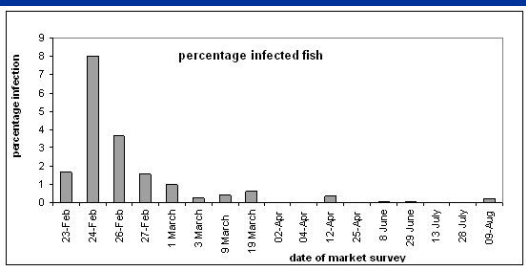
Hepsetus odoe Okavango Delta



Occurrence of EUS amongst fish species sampled during six surveys in Caprivi, from February 2007 to February 2008

| Fish species | Number weighed in and inspected | Number with sores | Percentage infected |
|---|---------------------------------|-------------------|---------------------|
| Threespot tilapia (<i>O. andersonii</i>) | 32 | 1 | 3.0 |
| Pink bream (<i>S. giardi</i> and black form) | 16 | 6 | 37.5 |
| Thinface largemouth (<i>S. angusticeps</i>) | 23 | 1 | 4.3 |
| Humpback largemouth (<i>Serranochromis altus</i>) | 18 | 0 | 0 |
| Nembwe (<i>S. robustus</i>) | 88 | 1 | 1.1 |
| Redbreast tilapia (<i>T. rendalli</i>) | 8 | 0 | 0 |
| Greenhead tilapia (<i>O. macrochir</i>) | 3 | 0 | 0 |
| Tigerfish (<i>H. vittatus</i>) | 6 | 0 | 0 |
| Sharptooth catfish (<i>C. gariepinus</i>) | 197 | 0 | 0 |
| Squeakers (<i>Synodontis</i> spp) | 188 | 0 | 0 |

Prevalence of fish with presumptive EUS lesions from the 2008 Zambezi Classic Angling Competition held at Kalimbeza from 22 to 25 August 2008.



Prevalence of diseased fish recorded on the Katima Mulilo Open Market between February and August 2007

EUS in South Africa

- Recognized in an artificial impoundment in the Palmiet River in the Western Cape Province
- Reported to the OIE in February 2011
- Cage farmed trout were unaffected
- Lesions were confirmed in large mouth black bass (*Micropterus salmoides*), in blue gill sunfish (*Lepomis macrochir*) and in an unidentified cichlid species

Resistant species

- Nile tilapia *Tilapia niloticus*
- Common carp *Cyprinus carpio*

Both species form the basis of important aquaculture industries



Tilapia niloticus

Many tropical and ornamental fish are susceptible to EUS



Dwarf gourami



Gold fish *Carassius auratus*

Spread of EUS

- Regional and internationally through the movement of fish:
 - aquaculture and ornamental purposes
 - bait fish for angling
- Locally by flood events

Environmental factors leading to outbreaks of EUS

- Lowering of pH of water due
 - disturbance of naturally acidic soils by agricultural and urban development
 - Acid mine seepage into natural water bodies
 - Flooding
- Drop in water temperature lowers the natural resistance of many fish species

FAO Regional Technical Cooperation Programme (TCP/RAF/311[E])

- "Emergency Assistance to Combat EUS in the Chobe-Zambezi River" was approved for implementation covering seven participating southern African countries (Angola, Botswana, Malawi, Mozambique, Namibia, Zambia and Zimbabwe)

The programme stresses the importance of:

- enhancing surveillance and diagnostic capacity
- formulation of a regional emergency response strategy
- increasing education and awareness
- promoting responsible trade in aquatic animals in both affected and unaffected areas.

Introduction of exotic diseases threatens:-

- natural aquatic species diversity
- livelihood of subsistence and commercial fishermen
- aquaculture development and investment
- Regional and international trade
- employment opportunities local economies



Pro-active regulatory bodies, with the capacity to implement sensible regulations based on OIE guidelines, will do much to protect indigenous fish stocks and to further sustainable development of aquaculture and associated economic growth in Africa

"It is unlikely that EUS will ever be eradicated from the upper Zambezi. EUS will remain a threat to other sensitive aquatic systems throughout Africa"

THANK YOU

