Queensland **the Smart State**

Biosecurity Queensland

Living with Hendra virus, a recently emerged infectious disease.

Ron
Glanville

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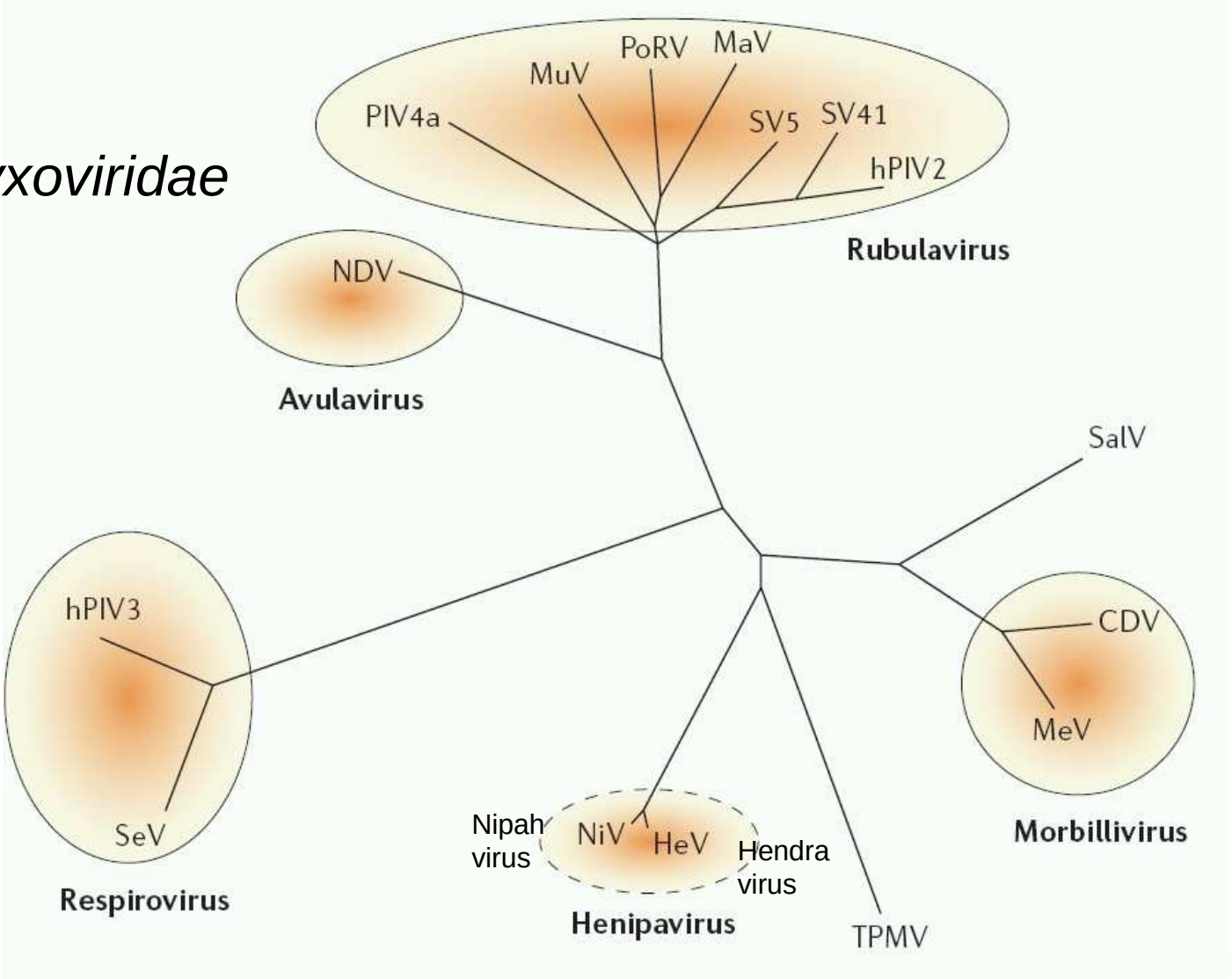
Summary..

- History.
- What we know about Hendra.
- Recent cases.
- Implications.
- R&D Priorities.

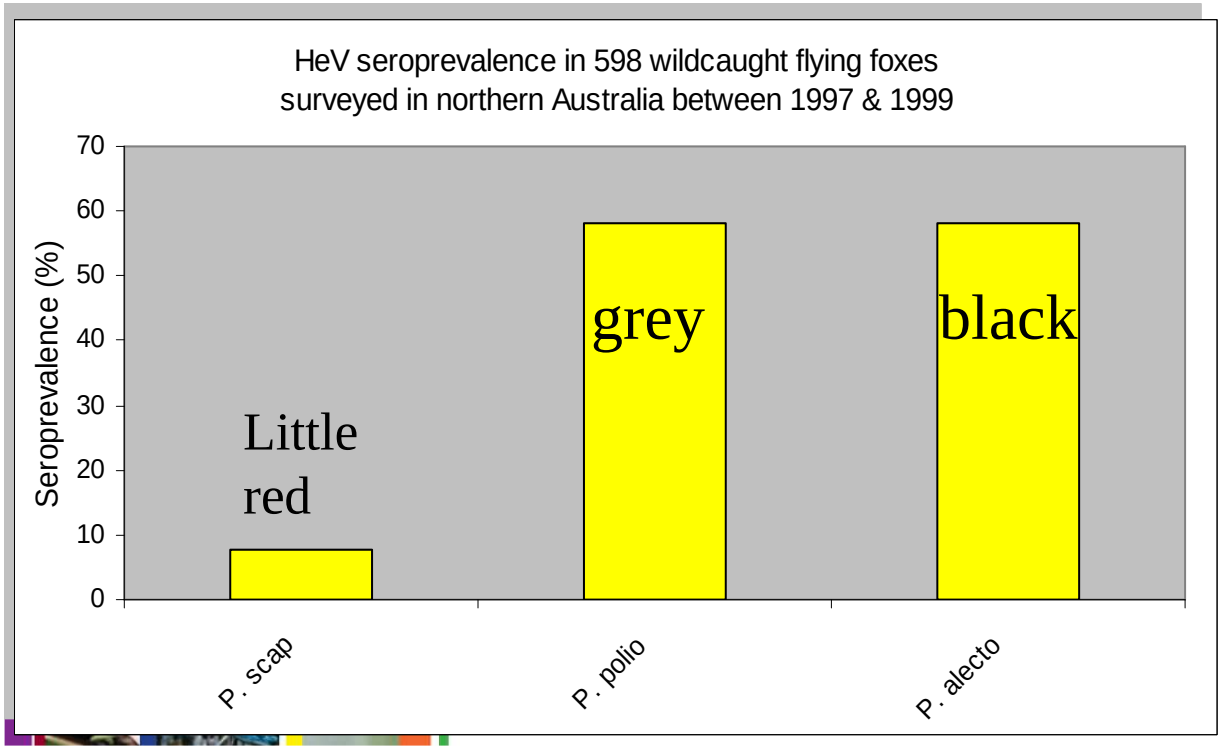
What is Hendra .....

family *Paramyxoviridae*



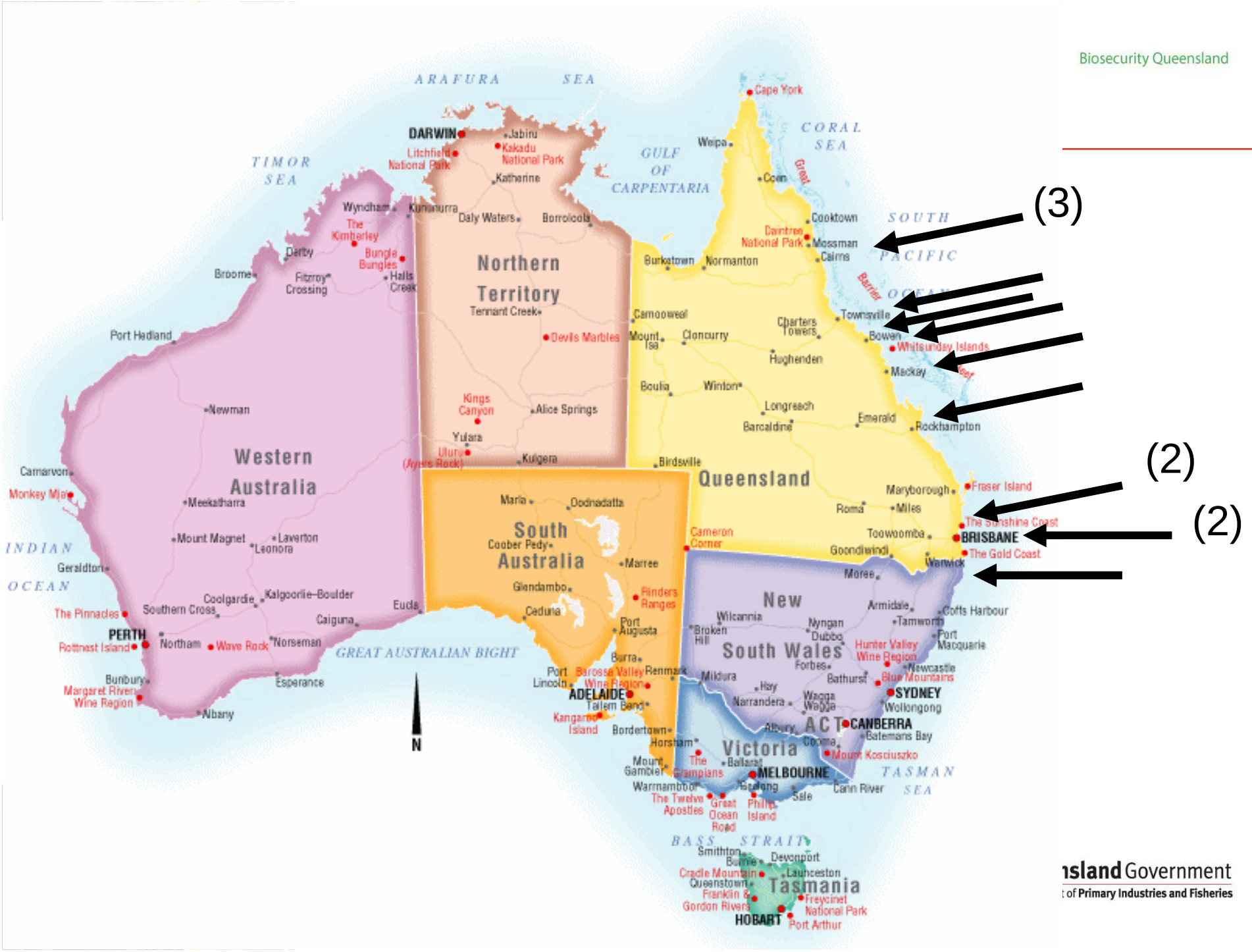
Reservoir host…..fruit bat

- high antibody prevalence (indicates infection in the past); but low rate of individual bat infection at any one time.
- virus has been recovered from bat kidney, foetal tissues, placenta.
- prevalence varies by time, location and the reproductive cycle - more common at the time of year bats are pregnant or lactating
- no evidence of infection in other bats.



Incident details..

Mackay	2 horses & one human (1)	August 1994
Hendra	20 horses & two humans (1)	September 1994
Cairns (Trinity Beach)	1 horse	January 1999
Cairns (Gordonvale)	1 horse & one human	October 2004
Townsville	1 horse	December 2004
Peachester	1 horse	June 2006
Murwillumbah	1 horse	October 2006
Peachester	1 horse	June 2007
Cairns (Clifton Beach)	1 horse	July 2007
Redlands	5 horses & two humans (1)	June 2008
Proserpine	3 horses (+ 1 possible)	July 2008
Rockhampton	4 horses. One human (1)	August 2009
Bowen	Two horses	September 2009


(3)
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ARAFURA SEA
CORAL SEA
TIMOR SEA
GULF OF CARPENTARIA
SOUTH PACIFIC OCEAN
INDIAN OCEAN
GREAT AUSTRALIAN BIGHT
TASMAN SEA
BASS STRAIT
N
DARWIN
Litchfield National Park
Kakadu National Park
Jabiru
Katherine
Daly Waters
Borroloola
Northern Territory
Tennant Creek
Alice Springs
Devils Marbles
Kings Canyon
Ulura (Ayers Rock)
Kulgera
Western Australia
Port Hedland
Broome
Derby
Wyndham
Kununurra
The Kimberley
Bungle Bungles
Fitzroy Crossing
Halls Creek
Newman
Carnarvon
Monkey Mia
Meekatharra
Mount Magnet
Laverton
Leonora
Geraldton
Coolgardie
Kalgoorlie–Boulder
Southern Cross
The Pinnacles
Eucla
Caiguna
PERTH
Rottnest Island
Northam
Wave Rock
Norseman
Bunbury
Margaret River Wine Region
Esperance
Albany
South Australia
Maria
Oodnadatta
Coober Pedy
Marree
Glendambo
Flinders Ranges
Ceduna
Port Augusta
Cameron Corner
Port Lincoln
Barossa Valley Wine Region
Renmark
Burra
ADELAIDE
Tailem Bend
Kangaroo Island
Bordertown
Mildura
Hay
Queensland
Cape York
Weipa
Coen
Great Barrier Reef
Cooktown
Daintree National Park
Mossman
Cairns
Burketown
Normanton
Camooweal
Mount Isa
Cloncurry
Charters Towers
Townsville
Bowen
Whitsunday Islands
Hughenden
Mackay
Boulia
Winton
Longreach
Barcaldine
Emerald
Rockhampton
Birdsville
Maryborough
Fraser Island
Roma
Miles
The Sunshine Coast
Toowoomba
BRISBANE
The Gold Coast
Goondiwindi
Warwick
Moree
New South Wales
Armidale
Coffs Harbour
Wilcannia
Tamworth
Nyngan
Broken Hill
Dubbo
Port Macquarie
Hunter Valley Wine Region
Forbes
Newcastle
Bathurst
Blue Mountains
Narrandera
Wagga Wagga
SYDNEY
Wollongong
ACT
CANBERRA
Albury
Batemans Bay
Victoria
Horsham
Cooma
Mount Kosciuszko
Mount Gambier
The Grampians
Ballarat
MELBOURNE
Warrnambool
Geelong
Sale
Cann River
The Twelve Apostles
Great Ocean Road
Phillip Island
Tasmania
Smithton
Burnie
Devonport
Cradle Mountain
Launceston
Queenstown
Franklin & Gordon Rivers
Freycinet National Park
HOBART
Port Arthur

What we know about Hendra virus

- Present in fruit bats in all areas of Australia plus Papua New Guinea.
  - Closely related Nipah virus is present in South East Asia and extending into Indonesia.
- Has been characterised genetically.
- Animals susceptible – only horses and people to date naturally, but other species, eg guinea pigs & cats have been infected experimentally
- Pathogenesis (disease process) in horses
- Ecology of fruit bats and behaviour of HeV virus in fruit bats
- Modes of excretion of virus from the body
- Spillover events from bats to horses only happen in paddock situations
- Low infectivity, but high mortality

Clinical features (1)

- **rapid onset of illness**
- **fever (over 40 ˚C)**
- **rapid deterioration in health**
- **respiratory signs that include:**
  - increased respiratory rate
  - respiratory distress
  - nasal discharge at death (sometimes frothy and/or blood stained).

And / Or…..

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Clinical features (2)

- **neurological signs that include:**
  - depression
  - loss of balance, problems getting to feet
  - loss of vision in one or both eyes
  - head tilting, circling
  - muscle twitching

Clinical features..

Other considerations:

- elevated heart rate (up to 90–100 beats/minute)
- facial swelling
- Where there are multiple cases, a high case fatality rate occurs within 48 hours.
- Some cases have initially been reported as colic.
- Bats in the area, though a lack of bat sightings does not preclude HeV.

Note – clinical signs vary widely and can be virtually any combination of the signs listed.

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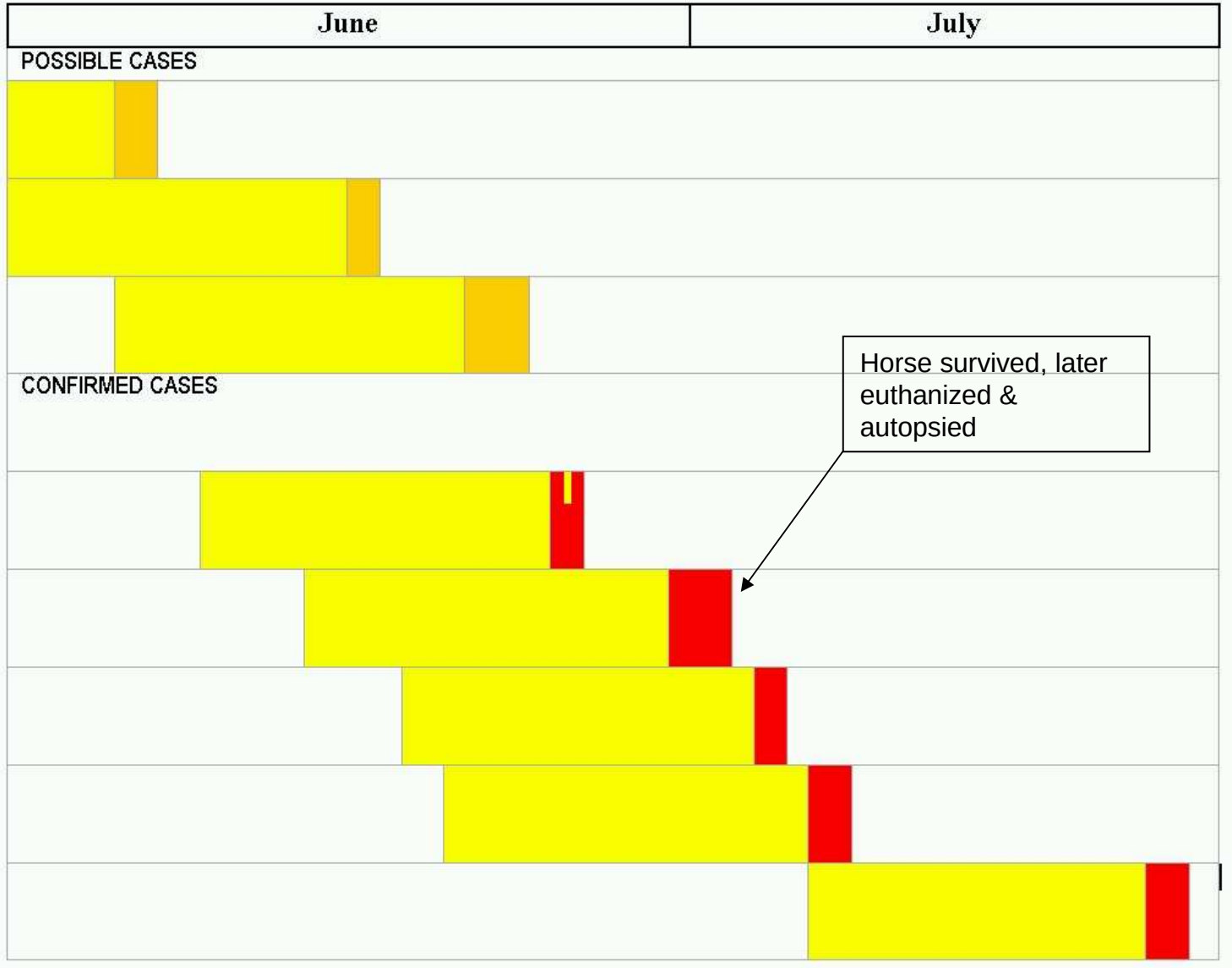
Pathology

- Gross pathology unremarkable – maybe pleural effusions
- Microscopically observed lesions of vascular damage and vasculitis
- Widespread and serious damage to capillary endothelium
- Virus uses a cell surface glycoprotein, ephrin B2, as a cell receptor.
- This receptor has a widespread cellular distribution, especially in vascular endothelial cells
- Virtually all organs infected
- Predominant clinical outcome (colic, respiratory, neurological etc) may depend on which organ system is sustaining severe and compromising endothelial damage
- Virus excretion at low levels can occur for a day or two before clinical expression

Timeline of confirmed and possible HeV cases, Redlands Vet Clinic, June/July 2008

Yellow = maximum known incubation period

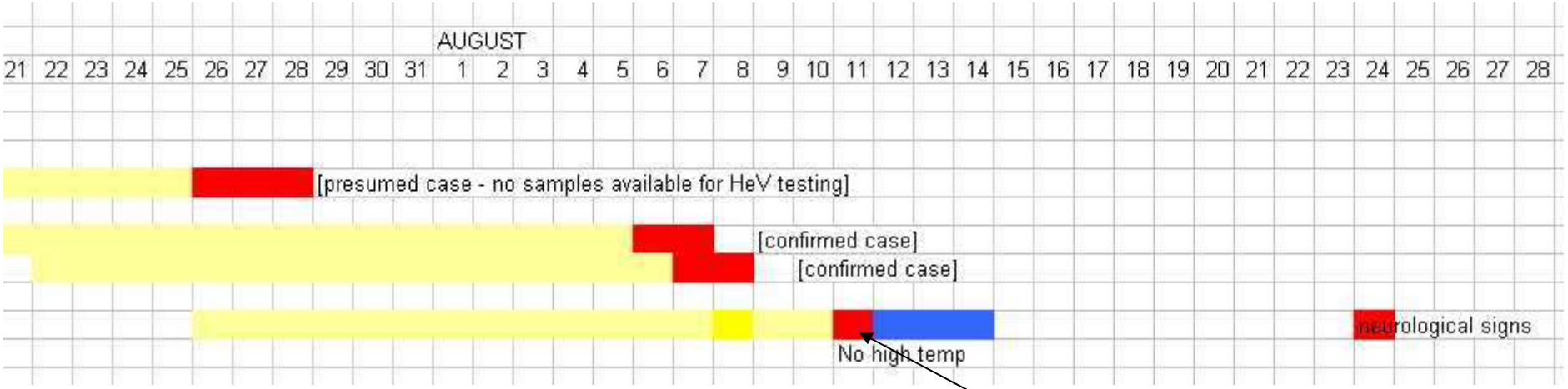
Red / orange = period of clinical signs



Proserpine Case

4 July	Mare died with a clinical signs consistent with Hendra virus infection. Suspected as snake bite. Buried with no PM
11 July	Gelding (son of 4 July horse) euthanized and necropsied after short clinical illness with some respiratory manifestation. Positive HeV
21 July	Second mare euthanized and necropsied after short clinical illness with respiratory manifestation. Positive HeV Mare's son short clinical illness at same time.
4 August	Mare's son confirmed SNT positive
4 September	Mare's son euthanised. 8 samples PCR positive.

Cawarral Case



Yellow = maximum known incubation period

Red = period of clinical signs

Horse had initial very mild disease but developed antibodies and subsequently mild neurological signs before being euthanized.

Why surviving, seropositive horses are euthanized

- Risk of recrudescence
  - Fatal human case in 1995
  - Nipah virus – 10% of survivors
- Scientific value of long term monitoring is limited
  - Scientific value of thorough post mortem is significant
- Balanced against risk to people if horse subsequently redevelops disease
- Potential trade issues

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Implications

- Hendra still rare – keep it in perspective
- Its not easy to catch – treat with respect, not fear.
- Vets are highest risk group, but horse owners / handlers also at risk
- Widening case definition – no typical hendra case
- Culture change required:
  - Always be alert, not just when there is an alert
  - Biosecurity standards
    - PPE
      - Suspect cases
      - Should become routine

Research focus..

- drivers for emergence.
- dynamics of infection in the reservoir.
- mode of transmission to horses.
- factors associated with spillover events (location, breed, age, housing).
- possible changing genetic profile of the virus
- risk management
- Diagnostics
- Vaccine