Common brushtail

- Native to Australia
- Introduced to New Zealand in the early 19th century
- Has since flourished, becoming an immensely destructive pest species
- Threat to biodiversity
- Wildlife reservoir for *Mycobacterium bovis*
Wobbly possums – discovery of a disease

- Appeared in a NZ research possum colony in 1995

- Initial ataxia, raised head carriage and head bobbing

- Progressed to rolling gait, dullness, slowed reactions, poor balance, inability to judge distances, difficulty climbing and diurnal feeding

- Terminally become weak, sleep on ground, semi-comatose, weight loss
Histological findings

- Mononuclear infiltration into various tissues, primarily around blood vessels consisting of lymphocytes and plasma cells

- Most severely affected tissues - liver and kidney

- Perivascular cuffing in brain
Results of NZ research

- Transmission studies
  - Crude tissue homogenates, frozen at -75°C and filtered to 0.22µm remained infective via various routes
  - Blood and urine are infective with possible transmission via mites
  - Close contact required

- Identification of a virus
  - Virus purification and electron microscopy yielded spherical or icosahedral, 45nm diameter viral particles
  - Borna-like virus
Meanwhile in Australia...

- Apparently similar cases had been seen by the Australian Registry of Wildlife Health, but closer inspection revealed differences.

- Australian condition includes blindness.

- Lymphoplasmacytic meningoencephalitis of greater severity and optic neuritis.

- No liver and kidney involvement.
- Type virus for the family Bornaviridae
- Spherical, enveloped, nonsegmented negative-strand RNA virus
- Distinctive for nuclear localization of replication and transcription
Borna Disease Virus

- Horses and sheep are most susceptible, also cattle, cats, dogs and ostriches
- Suggested association with neuropsychiatric disorders in humans
- Clinical sings: pharyngeal paralysis, hyperesthesia, circling, muscular tremors and spasms, blindness, drowsiness and flaccid paralysis terminally
- Perivascular cuffs of L/P in olfactory bulbs, hippocampus, limbic system, basal ganglia, brainstem, optic nerves and retina
- Joest-Degen bodies are intranuclear or rarely intracytoplasmic inclusions
**Borna Disease Virus**

**Acute Infection (4-8 weeks)**
- Cell mediated immunity
  - CD4+ Th1
  - CD8+
  - NK cells
  - Macrophages

**Chronic infection (>15 weeks)**
- Humoral immunity
  - CD4+ Th2
  - Loss of capacity of lymphocytes from acute phase to lyse BDV-specific target cells
  - Apoptosis of perivascular inflammatory cells
Proventricular dilatation disease
- Conclusions
- Questions

- Is wobbly possum disease in NZ related to that in Australia?
  - Did it travel with the introduced possums and has since experienced antigenic drift?
  - Did it exist in NZ prior to the possums’ arrival and if so, in what?
  - Is it a new introduction to NZ since the possums’ arrival?

- Are either of these diseases caused by a Bornavirus?

- Are any other species at risk?