"Hypothesis Driven Research of Changing Disease Patterns: The Role of Collections with Three Case Studies"

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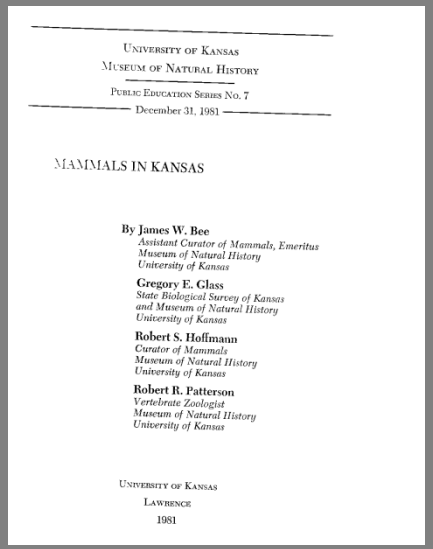
Once Upon a Time…



University of Kansas
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MAMMALS IN KANSAS

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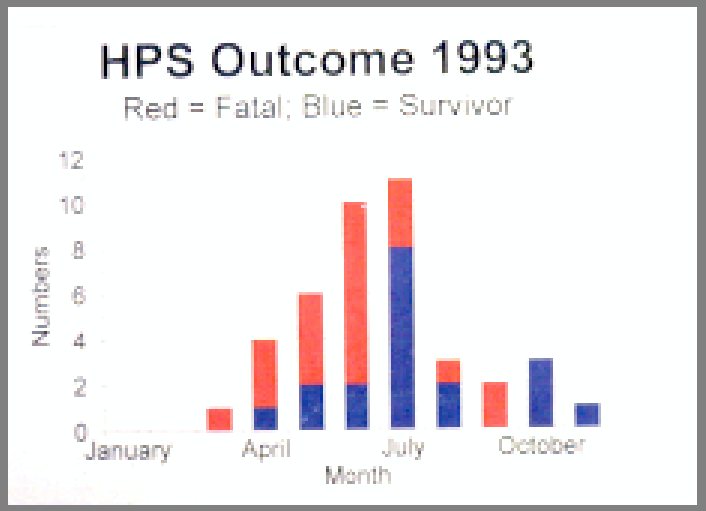
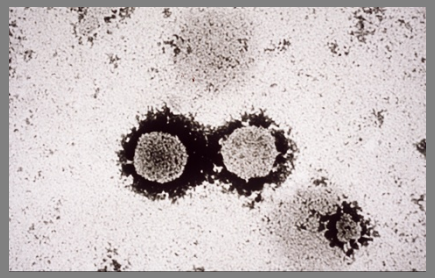
‘Mystery Navaho Illness’ – Spring 1993

vascular leak syndrome rapidly progressing non-cardiogenic pulmonary edema followed frequently by cardiogenic shock – highly lethal

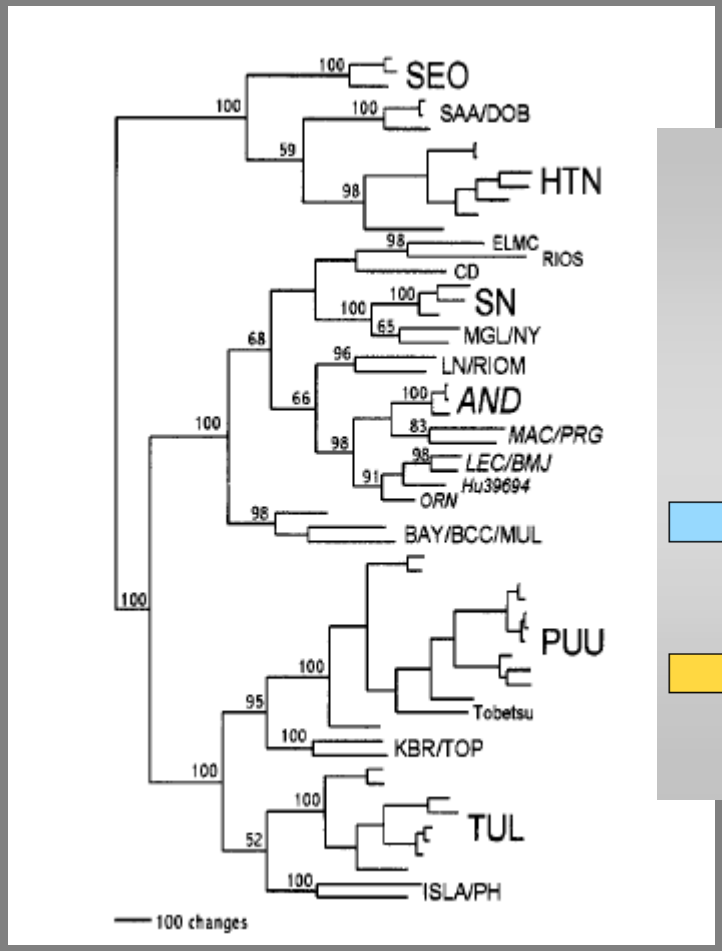


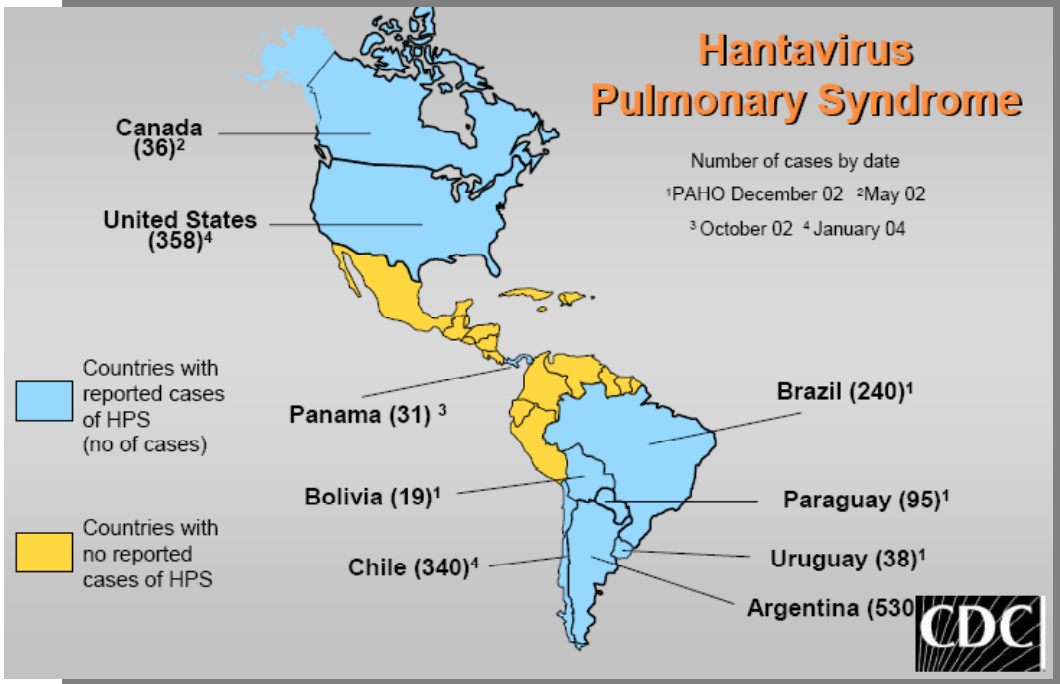


Where Did Such A Lethal Agent Come From? Why Didn't We See it Before?

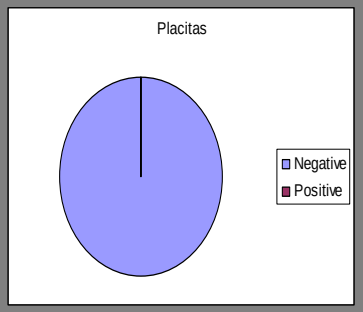
- The appearance of such a striking and lethal disease led to proposals that this represented a release from a laboratory
- MSB frozen tissue collections showed evidence of virus prior to 1980's
- Key because no hantavirus was known prior to 1980

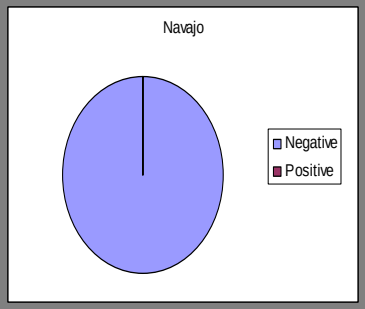
Relationship Between Known Viruses and Muridae Identified Likely New Reservoirs

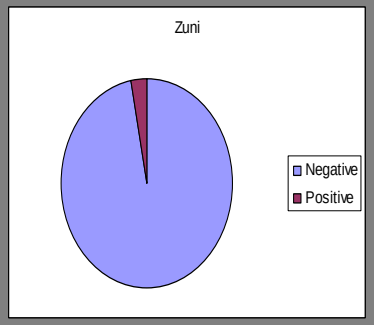


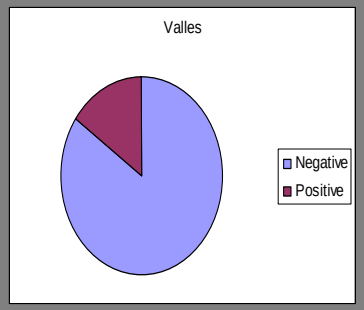


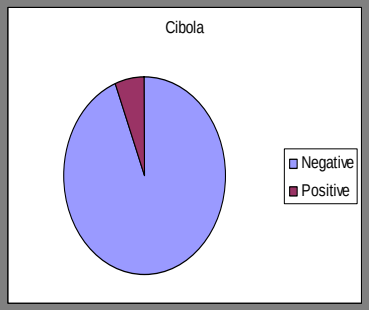
Where is the Virus When the Human Risk is Low?

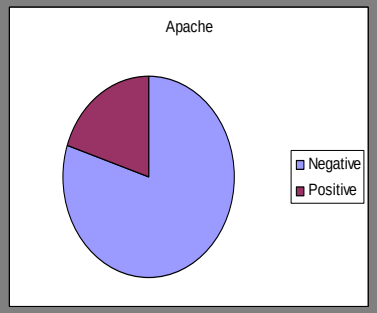




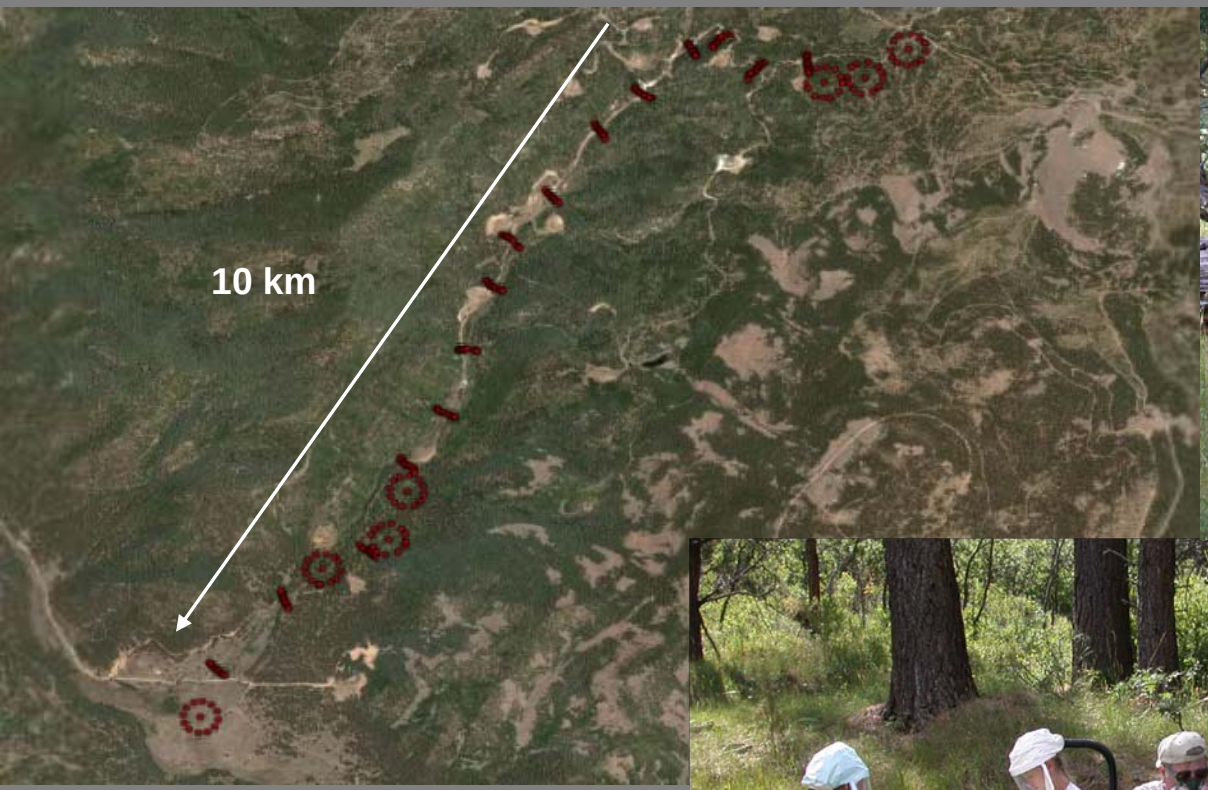




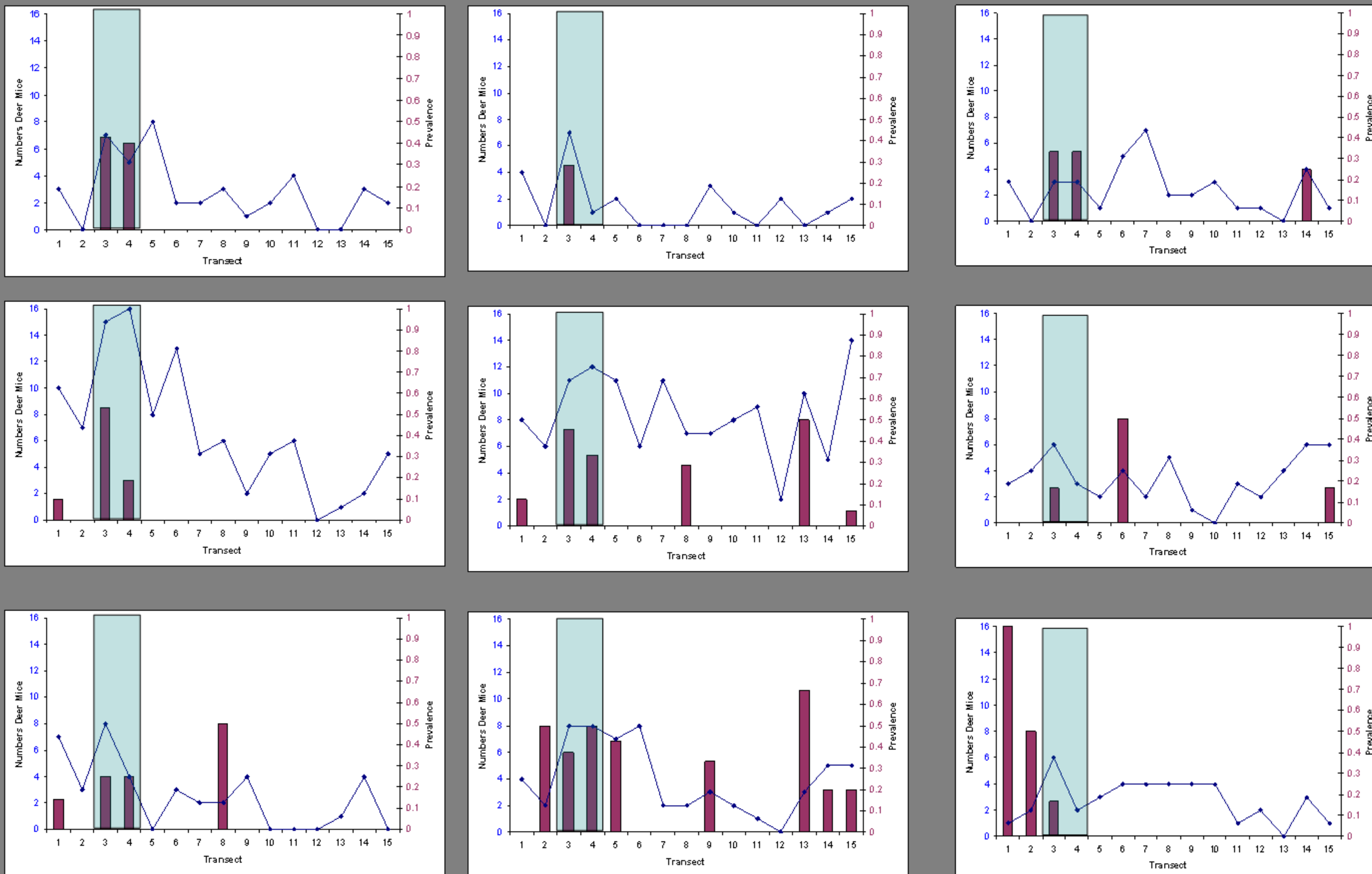




Some Local Areas Remain High Risk Year after Year



Virus Persists in Local Areas and Spreads each Year



2005 2006 2007

…And The Future

- Recent history suggests that there will be more and new agents moving from other animal populations into humans.
- Can we predict which ones (or groups) are likely to make transition
- What are their characteristics?

- December 2009 Meeting to determine if it is feasible to pursue question of predictability

Outcomes

- Do similarities and differences we see in comparative studies of viruses within and among functional groups allow us to rule out biological aspects of jumping viruses?

- Patterns generate hypotheses to be tested in field/lab of where and what the viruses we want should look like.
- Results
- Tells us how often jumping takes place
- Clues as to how/why
- Viruses that haven't jumped may be the most important to study

YARU

- Rockefeller Foundation Viral Laboratories 1930's-1960
- Moved to Yale University 1964 – YARU
- WHO International Reference Centre for Arboviruses
- Collection split →UTMB & CDC 1990's

The Collection

- **5000 strains extending back to 1930's though most heavily after late 1950's**
- **Would have variety to meet various selection criteria**

- **Focus on arboviruses and zoonotic (rodent-borne) viruses**

- **Most of public health or vet significance**
- **Many of these isolates associated with outbreaks as well as isolates from active surveillance**

- **Others are orphan, uncharacterized viruses or have become problems since**

Collection

- Known Problem viruses
- Dengue, West Nile, Japanese encephalitis, Yellow Fever, EEE, VEE, SLE, TBE, RVF, arenaviruses, hantaviruses

- Emergent viruses
- West Nile, Oropouche, Mayaro, Congo (of Crimean-Congo hemorrhagic fever), Zika, Nepah, Chandipura

- Never jumped viruses
- ‘several hundred’ orphan viruses and agents that have never been fully characterized or identified

Summary

- Scientific collections provide key information about the dynamics of species
- They provide us with important clues to factors that drive changes in the occurrence and distribution of species that in turn
- Provide us with important clues with how species that impact human populations have their effects.

Dedication