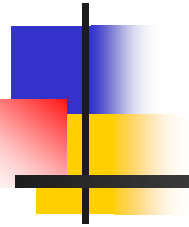


One Health: A Concept for the 21st Century



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Acknowledgments

- Present Collaborators:
 - Bruce Kaplan DVM, Dipl. AVES (Hon)
 - Tom Monath MD
 - James H. Steele DVM, MPH
- Past Leaders:
 - Calvin Schwabe DVM, DSc
 - 19th century: Virchow, Osler



Many organizations and individuals support the One Health Initiative

- American Veterinary Medical Association
- American Medical Association
- American Society for Microbiology
- American Society of Tropical Medicine and Hygiene
- American Phytopathological Society
- Association of Schools of Public Health



Outline Part I

- The One Health Initiative
- A Brief History of One Health
- The Challenge of Zoonotic Diseases



Outline Part II

- Areas for Collaboration
 - A. Individual Health
 - B. Comparative Medicine Research
 - C. Public Health
- Global and National One Health Efforts
- Summary
- Challenges Ahead



- Recognizing the inter-connectedness between human, animal, and ecological health, the OHI seeks to increase communication, collaboration, and cooperation across a wide variety of disciplines including human medicine, veterinary medicine, public health, microbiology, ecology, and others.
- <http://www.onehealthinitiative.com>

A Brief History of One Health: Beginnings of Veterinary Medicine

- Pope Clement XI instructed his physician, Dr. Giovanni Maria Lancisi, to do something about rinderpest
- Rinderpest is a highly lethal viral disease of cattle that was devastating the human food supply



Animal Disease Control Measures



- Lancisi recommended that all ill and suspect animals be destroyed.
- Principles were a milestone in controlling the spread of contagious diseases in animals.

One Health in the 19th Century



- Rudolf Virchow (1821-1902), a German physician and pathologist said, "between animal and human medicine there are no dividing lines--nor should there be."

Early Meat Inspection Programs

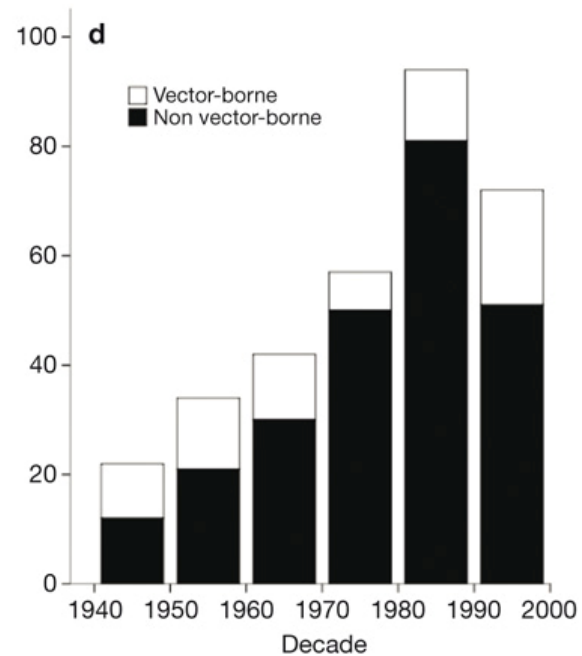
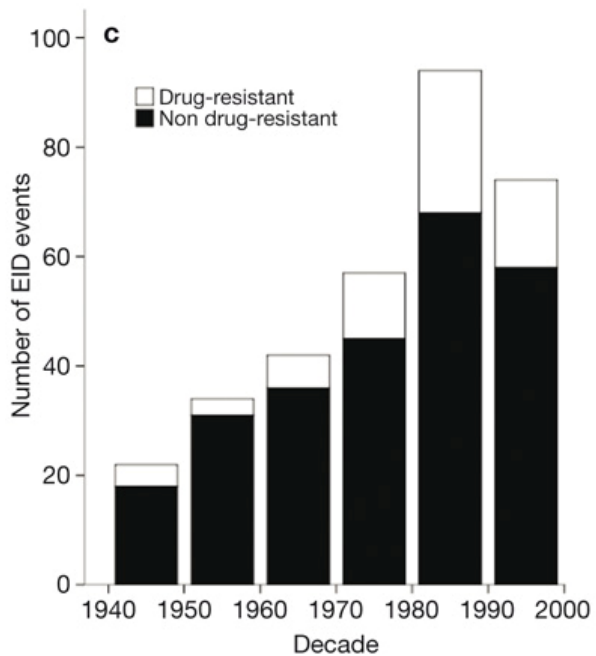
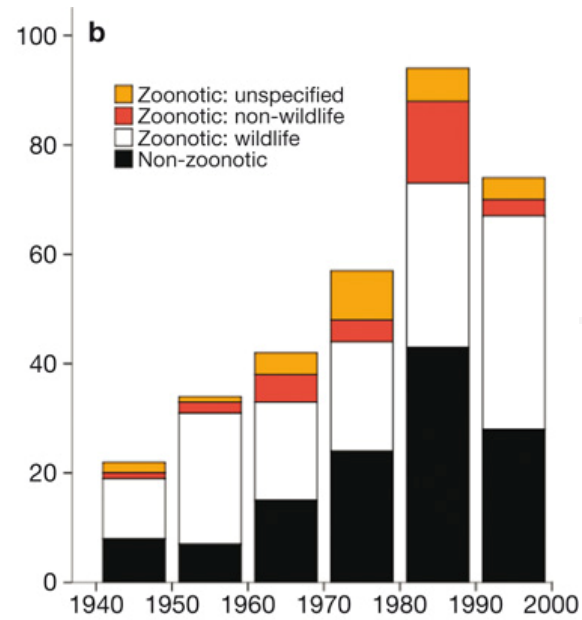
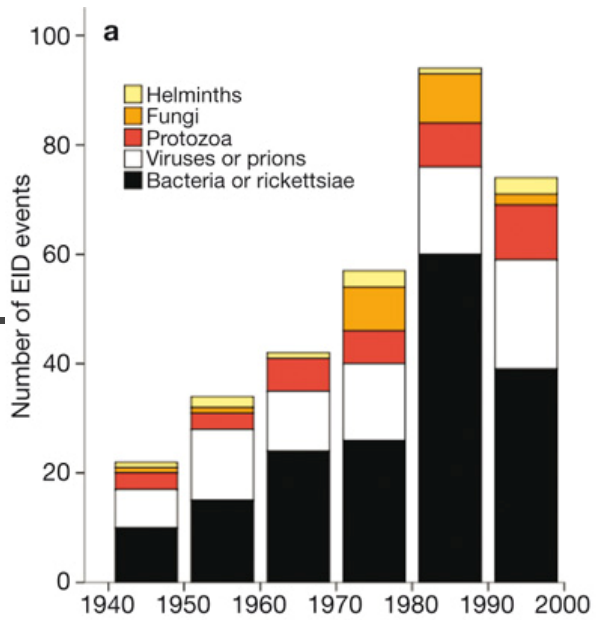
- Virchow's father was a butcher.
- Animal experiments on life cycle of *Trichinella spiralis* in porcine muscular tissue.
- Cysticercosis and tuberculosis in cattle.



The Challenge of Zoonotic Diseases



:: view large map ::





Many Emerging Infectious Diseases are Zoonotic

- Avian Influenza (Bird Flu)
- Bovine Spongiform Encephalopathy
- HIV/AIDS
- SARS
- Nipah virus



Many of the Agents of Bioterrorism are Zoonotic

CDC Category A Agents:

Anthrax (*Bacillus anthracis*)

Plague (*Yersinia pestis*)

Tularemia (*Francisella tularensis*)

Viral Hemorrhagic Fever Viruses (Ebola,
Marburg, Lassa, Machupo)



Reasons for the Emergence of Zoonotic Diseases

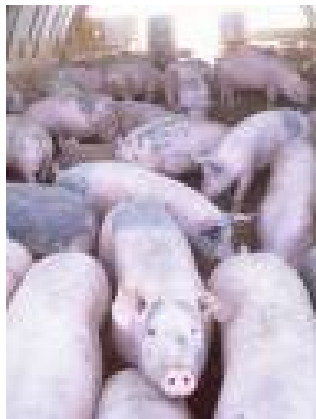
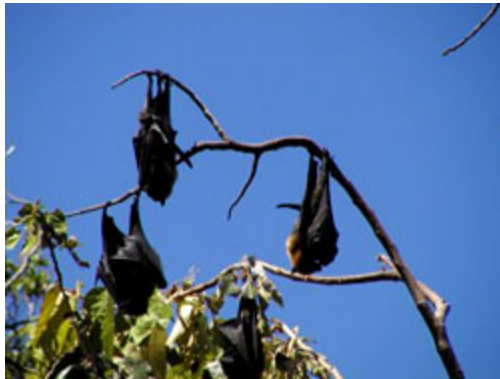
- Better Reporting and Technology
- Microbial Adaptation
- Human Population Pressures
- Poverty and Susceptibility to Infection
- Economic Development and Land Use
- Bush Meat Consumption
- International Travel
- Exotic Animal Trade
- Intent to Cause Harm

HIV/AIDS Pandemic

- Disease became recognized in the early 1980's.
- Probably emerged from consumption of bushmeat in Africa.
- At the end of 2003, more than 1M people living with HIV in US alone.



Nipah Virus Emergence



- Nipah virus outbreak in Malaysia in 1998-99.
- Flying fox or fruit bat was the likely vector.
- Infected pigs which then infected humans.

SARS Outbreak



- Civet cats originally thought to be host of the SARS coronavirus that emerged in 2002-2003.
- Scientists subsequently determined the natural host to be the fruit bat.
- Over 800 people died during this outbreak.

Avian (H5N1) Influenza

- First cases in humans in 1997.
- International attention to human and animal health connection.



The Need for Collaboration



- Human and animal diseases have been treated as separate entities.
- Physicians and veterinarians rarely communicate and work together.
- Ecology of microorganisms is generally not emphasized in medical school.
- Medical students might not see the importance of zoonotic diseases and their impact on human and animal health.
- Veterinary medical schools have shifted their focus from livestock medicine and comparative medicine research to companion animal medicine.



Areas for Collaboration

- Individual Health
- Comparative Medicine Research
- Public Health
 - National
 - International



Individual Health Collaboration

- Increased medical and veterinary medical education on the ecology of zoonotic microorganisms.
- Jointly sponsored medical and veterinary medical conferences on zoonotic risks.
- Collaborative efforts in the clinical setting—assessing risks—with well-defined roles and responsibilities.
- Encourage pet owners to take their animals to veterinarians for regular check-ups.
- Jointly sponsored clinical studies, especially involving immunosuppressed humans and animals.



Comparative Medicine Research Collaboration

- Comparative medicine is the study of the anatomical, physiological, and pathophysiological processes across species, including humans.
- Research in this discipline would help to answer many important questions
 - Why bats are the host species for a number of deadly diseases like rabies, the Nipah virus, and SARS.
 - Why carnivores like dogs are relatively resistant to anthrax exposure via the respiratory tract.

Comparative Medicine Research Challenges



- Not enough physicians and veterinarians are choosing to pursue biomedical and comparative medicine research as a career.
- Few physician-scientists and even fewer veterinarian-scientists.
- Lack of mentors, research opportunities, and funding.
- Disproportionate (approx. 4.5 fold difference) numbers of accredited schools: 28 accredited veterinary medical schools versus 125 accredited medical schools in the U.S.
- On a global scale, the difference is similar:
 - Approx. 440 veterinary medical schools worldwide. AVMA Council on Education lists 12 accredited veterinary medical schools outside U.S.*
 - Over 2000 medical schools worldwide. In 46 nations, accreditation by either an independent or government entity is mandatory.**

*AVMA Membership Directory and Resource Manual 2006.

**Foundation for the Advancement of International Medical Education and Research (FAIMER) at FAIMER.ORG



Public Health Collaboration

- National

- International

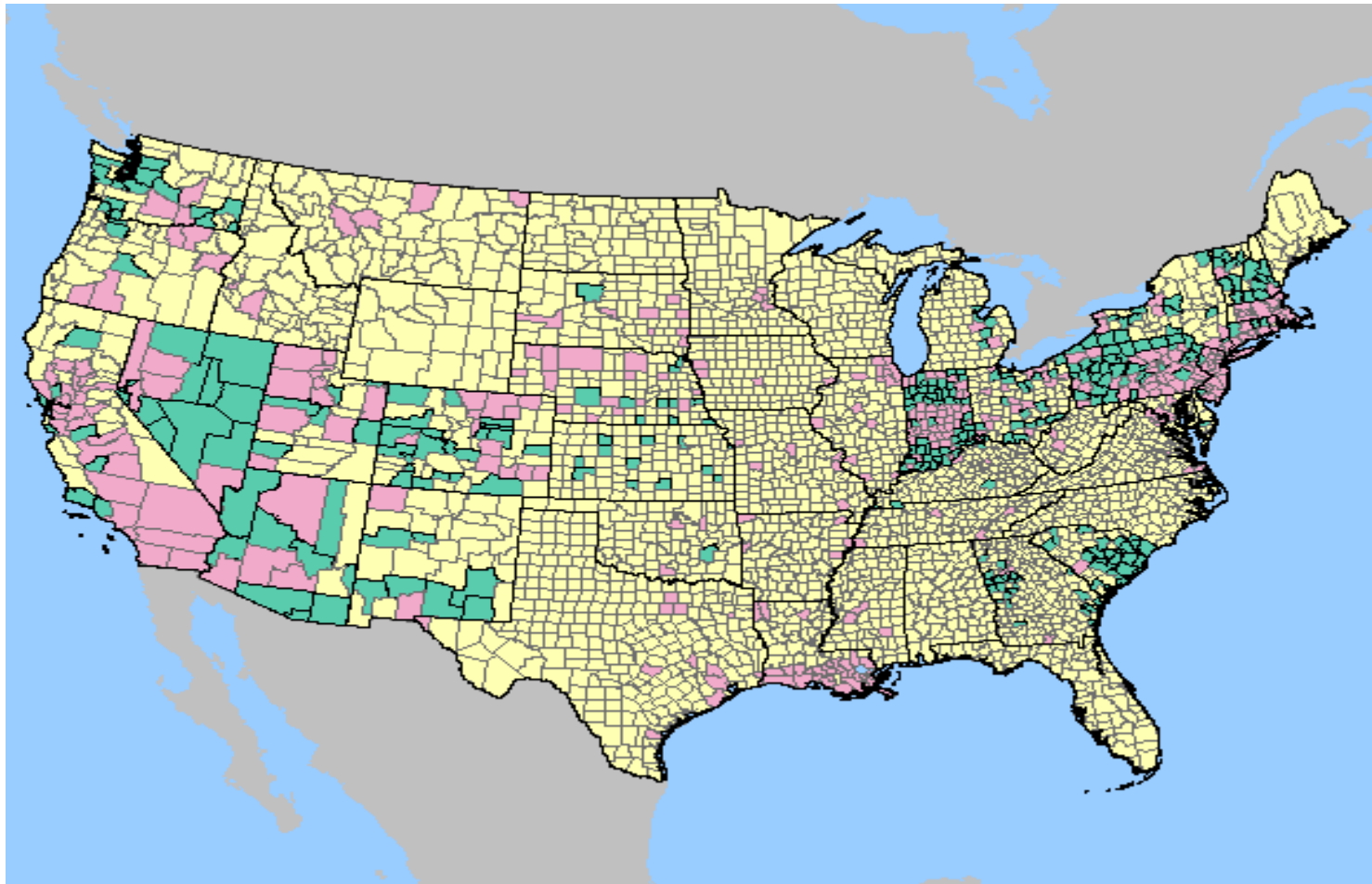


National Collaboration in Zoonotic Disease Surveillance

- In 1999, the CDC established ArboNET, a cooperative surveillance program that monitors the geographic spread and incidence of West Nile virus in mosquitoes, birds, humans, and other animals.

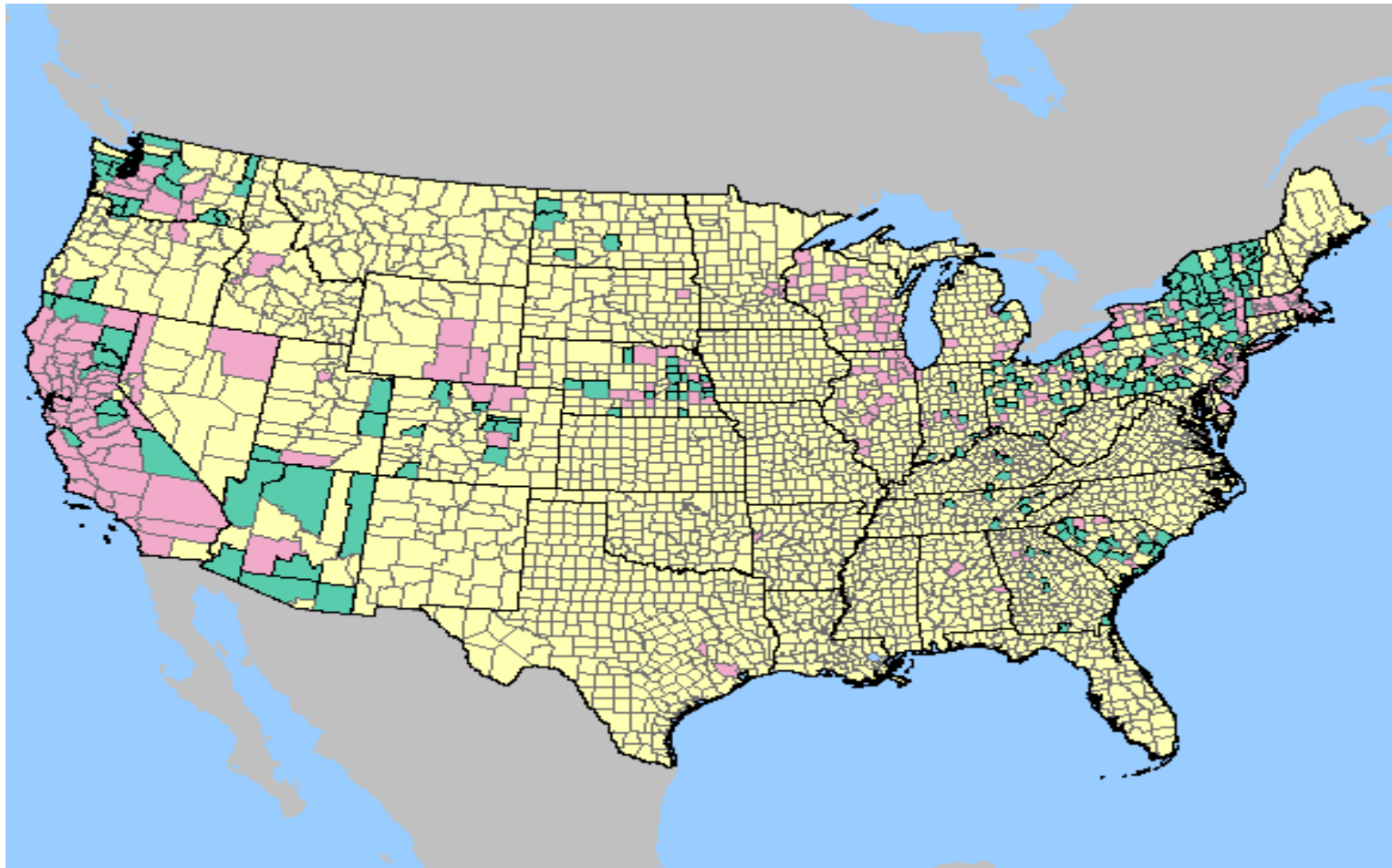
Cumulative Mosquito WNV Infections (8486) as of Nov. 18 2008

http://diseasemaps.usgs.gov/wnv_us_mosquito.html



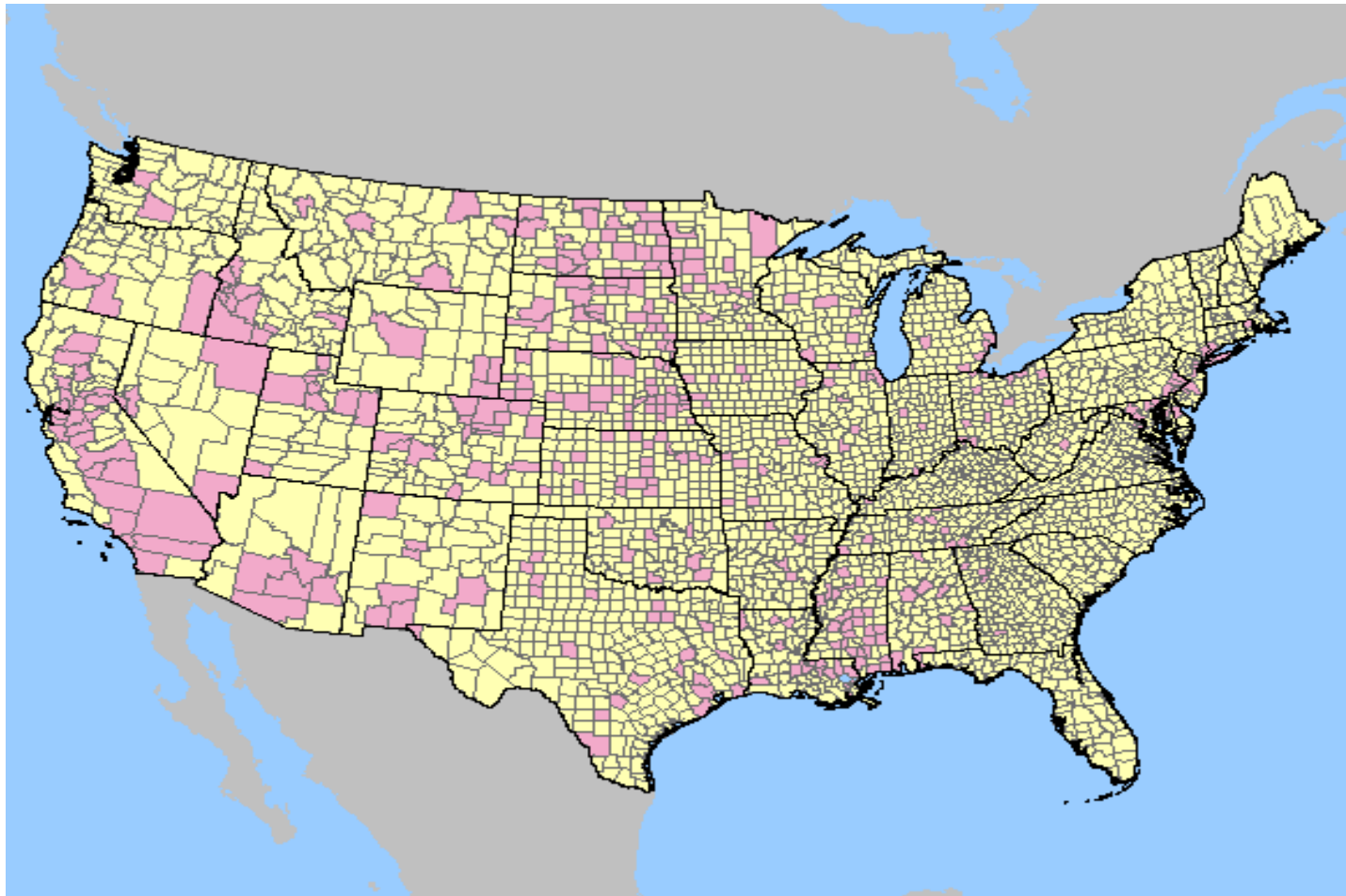
Cumulative WNV Dead Birds (2968) as of Nov. 18 2008

http://diseasemaps.usgs.gov/wnv_us_bird.html



Cumulative Human WNV Disease Cases (1301) as of Nov. 18 2008

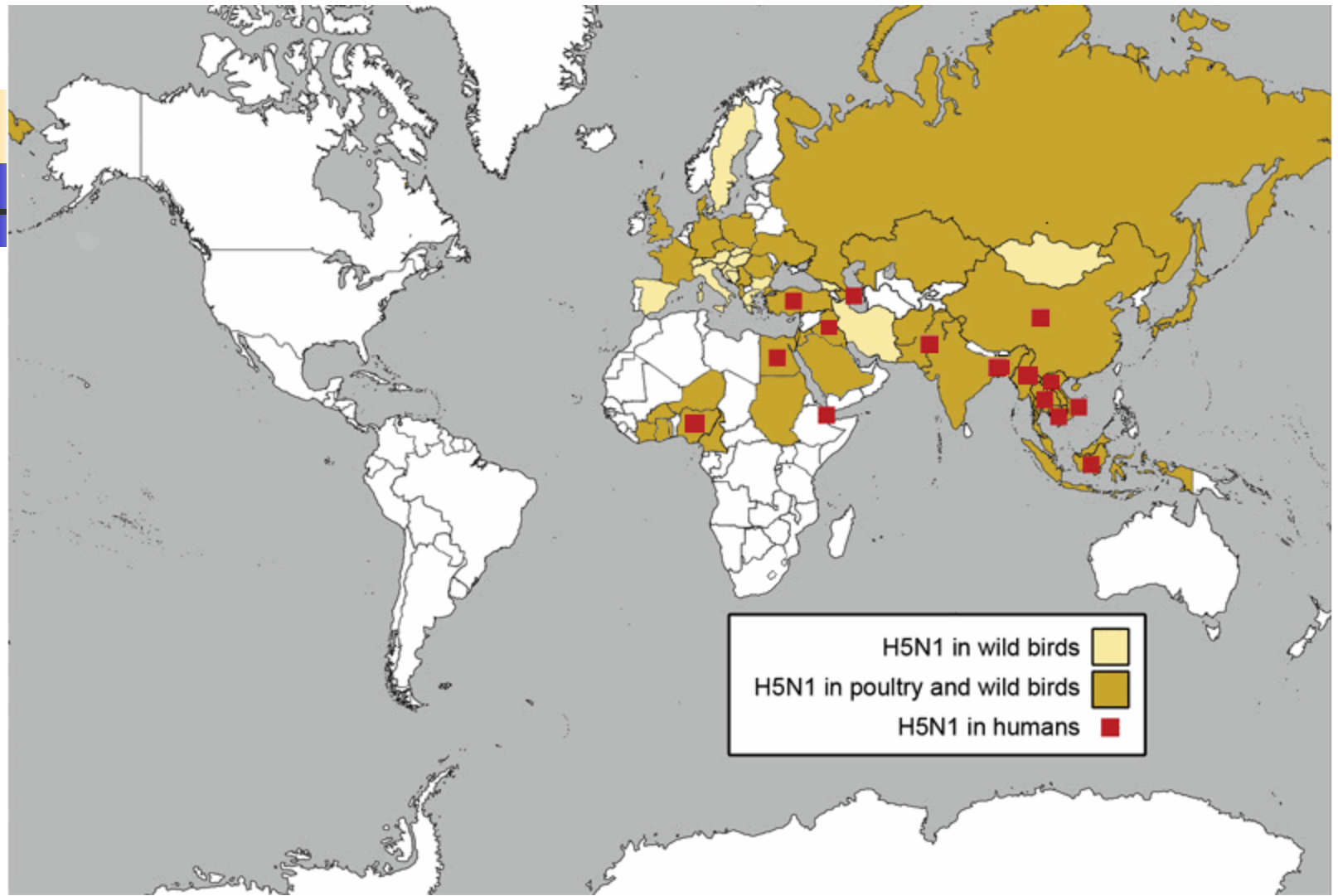
http://diseasemaps.usgs.gov/wnv_us_human.html





International Collaboration in Zoonotic Disease Surveillance

- Global surveillance of H5N1 avian influenza in wild birds, poultry, and humans has allowed nations to track a potential human pandemic before it starts.
- Global Early Warning and Response System (GLEWS) for transboundary animal diseases and major zoonoses is a joint FAO, OIE, and WHO initiative.



<http://pandemicflu.gov/>



U.S. Support for International Avian and Pandemic Influenza Assistance

- Oct. 2008, U.S. announced at International Ministerial Conference on Avian and Pandemic Influenza, Sharm el-Sheikh, Egypt that it would pledge \$320 million for assistance.

<http://www.state.gov/r/pa/prs/ps/2008/oct/111241.htm>



Global One Health

- FAO has produced a strategy paper on behalf of its partners (OIE, WHO, UNICEF, and World Bank) incorporating the One World, One Health concept.
- Canadian govt. has offered to organize a 2009 meeting in Winnipeg to discuss "One World, One Health."



One Health in the U.S.

- June 2007, through leadership of Ron Davis, MD, then AMA President, and Roger Mahr, DVM, then AVMA President, AMA unanimously passed a One Health resolution that endorsed increased communication and collaboration with veterinarians.
- July 15, 2008, AVMA One Health Task Force chaired by Lonnie King, DVM, released its Final Report Recommendations on strategies to implement One Health.
- July 2008, AVMA passed a One Health Initiative resolution endorsing the need to work with the human medical and public health communities.



AVMA One Health Initiative Task Force recommendations

- One Health Joint Steering Committee
- National One Health Commission
- NAS One Health Study
- National One Health Summit

<http://www.avma.org/onehealth/recommendations.asp>



Summary

- Zoonoses are diseases of animals that can infect humans.
- As the human population explodes, interactions with new zoonotic agents (e.g. viruses) from animal populations will continue to increase.
- Can expect more emerging zoonotic diseases.
- The One Health Initiative addresses the need for greater collaboration on many levels (individual, public health, and research) between human, animal, and public health professionals.
- Recent AMA and AVMA actions present exciting new developments towards the implementation of the One Health Initiative.
- Many organizations and individuals endorse the One Health Initiative, but considerable effort remains to implement the concept globally.



Challenges in One Health Implementation

- Legal
- Logistical
- Financial
- Organizational
- Philosophical



Thank you!

It's time to
embrace
One Health.

