

“One Medicine/One Health”: Personal Reflections of a True Believer

Thomas P Monath MD
Kleiner Perkins Caufield & Byers

Acknowledgements:

Ron Davis MD, President AMA

Laura Kahn MD, Professor, Princeton

Bruce Kaplan DVM



Ron M. Davis MD
President AMA

- **Epidemic Intelligence Service**
- **Preventive Medicine residency, CDC**
- **Chief Medical Officer, Michigan**
- **Director CDC Office of Smoking & Health**
- **Director, Center for Health Promotion, Detroit**
- **Adjunct Prof U Michigan School of Pub Health**
- **Founding Editor *Tobacco Control***
- **No. Am Editor, *BMJ***

What is “One Health”?

- Cooperation between Human and Veterinary Medicine in selected endeavors
- Building on common pool of knowledge in physiology, pathology, epidemiology, etc.
- Simultaneous study of zoonotic diseases in people, domestic and wild animals

Historical roots

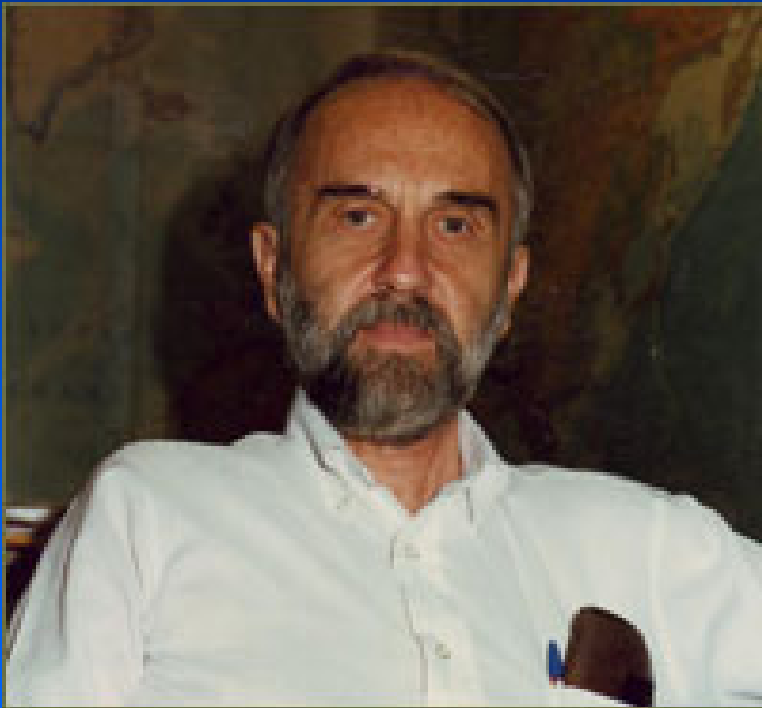
- 19th Century: Virchow, Osler, McFaddyeen, others connected human and veterinary medicine (comparative medicine)

Current Status of "One Health"

- In the 20th century, human and animal diseases have been largely treated as separate entities.
- Physicians and veterinarians communicate and work together episodically
- Zoonotic diseases and their impact on human and animal health are not taught, monitored, prevented and treated in an integrated way.
- Despite its potential, comparative medicine is poorly supported

Calvin W. Schwabe DVM DSc (1927-2006)

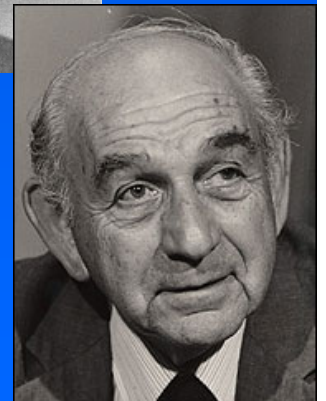
"Father of Veterinary Epidemiology"



- Coined the term "One Medicine"
- Proposed unified medical/veterinary approach to zoonotic diseases

Some Key Figures

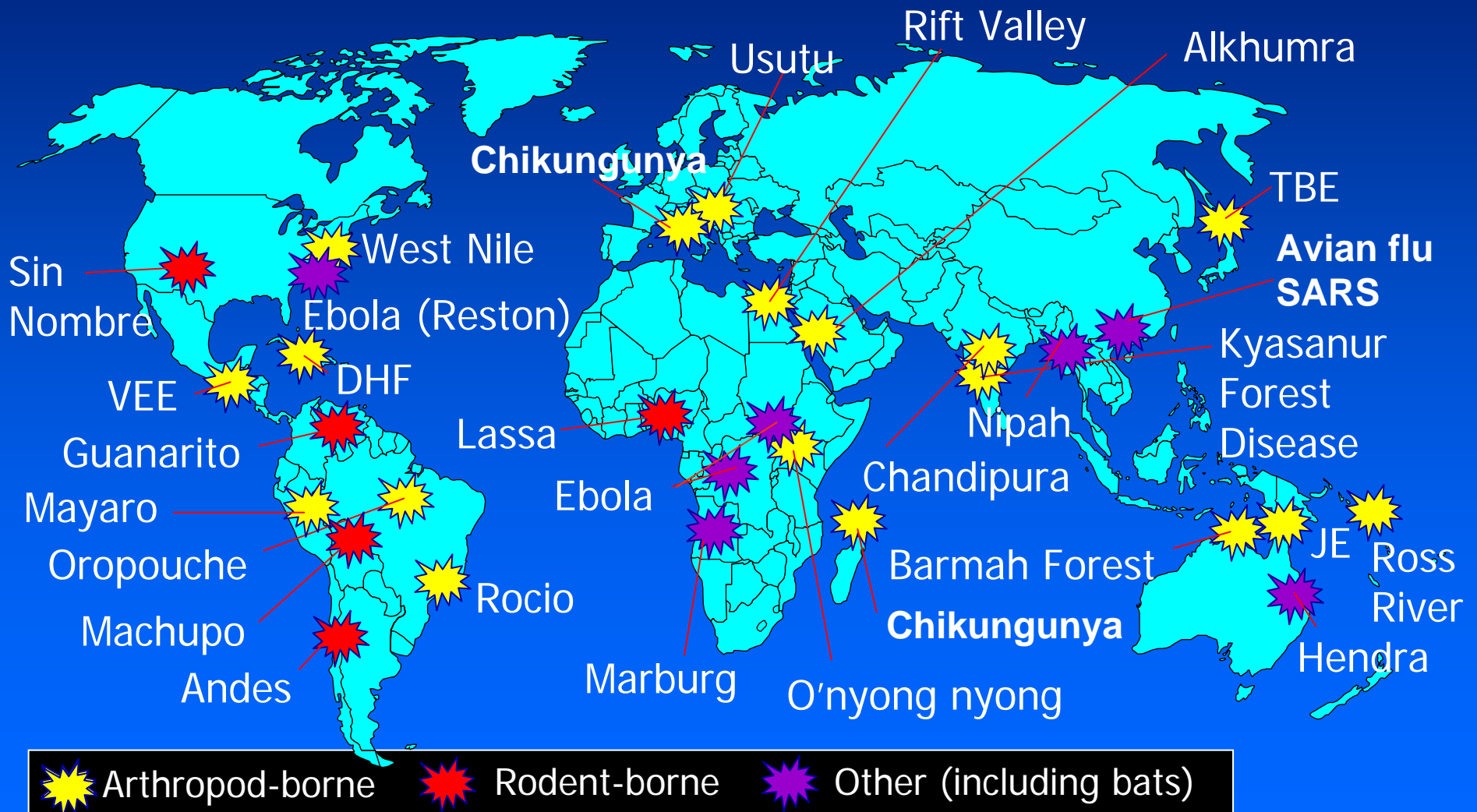
- Joseph W. Mountin MD
 - Founder of CDC (1946)
 - recognized tropical and zoonotic disease threats
- James W. Steele DVM
 - Founded first veterinary public health program in PHS
 - Established USPHS links with USDA
- Fred Soper MD
 - Rockefeller Found., Director PAHO
 - Strong supporter of VPH
 - Established first Zoonosis Center (Argentina)
- Martin M Kaplan DVM



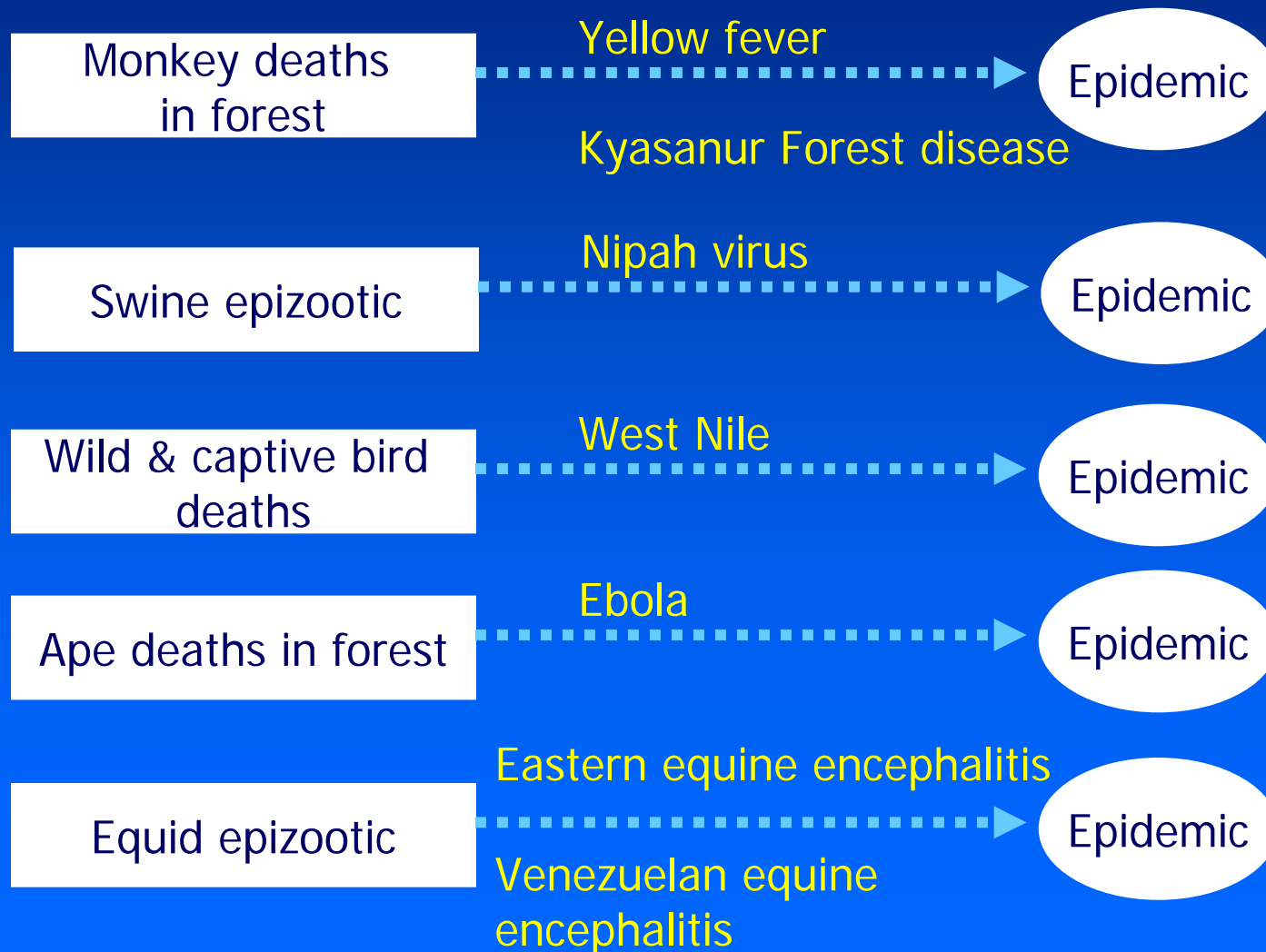
Joint FAO/WHO Efforts

- Institutionalized VPH in the 1980s
- Concept of sustainable development of people, animals, ecosystems
- Joint FAO/WHO Expert committee on zoonoses identified more than **150 zoonotic diseases in 1967.**
- **By 2000, more than zoonoses were recognized**
- **> 30% increase of zoonotic diseases in the last third of the 20th century.**

Emerging infections: concept becomes reality



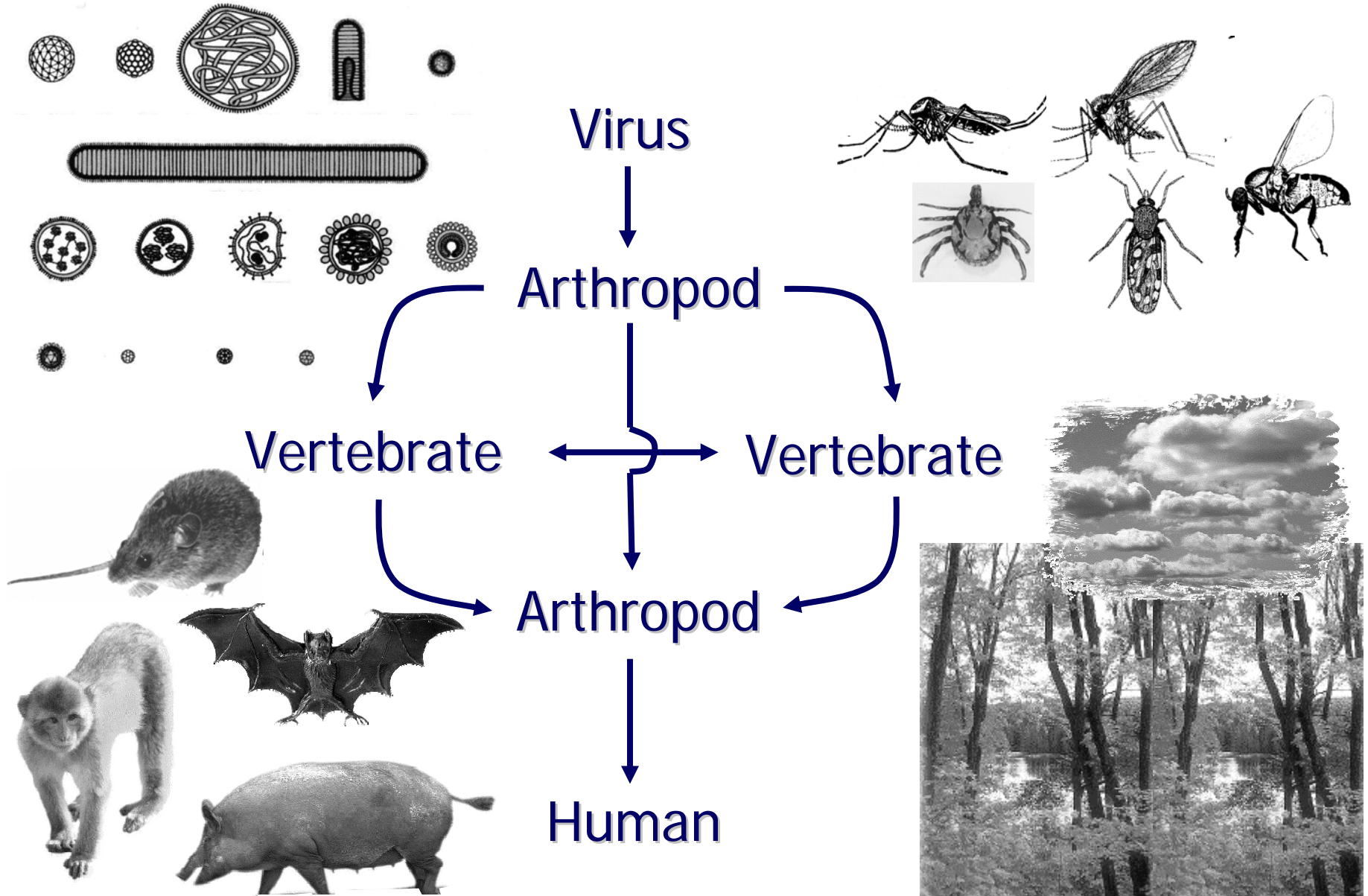
Examples of diseases that regularly emerge as animal pathogens in advance of human outbreaks



Need for simultaneous study of disease in humans and animals

- Increasing cadence of emerging infections
- Complex inter-relationships between humans, food animals, wildlife, the environment
- Integrated surveillance to reduce time for detection
- Practical approaches to integrate veterinarians and public health workers on zoonoses.

Most complex discipline





NIPAH

SARS



EBOLA



Ann. Rev. Med. 1982. 33:1-29

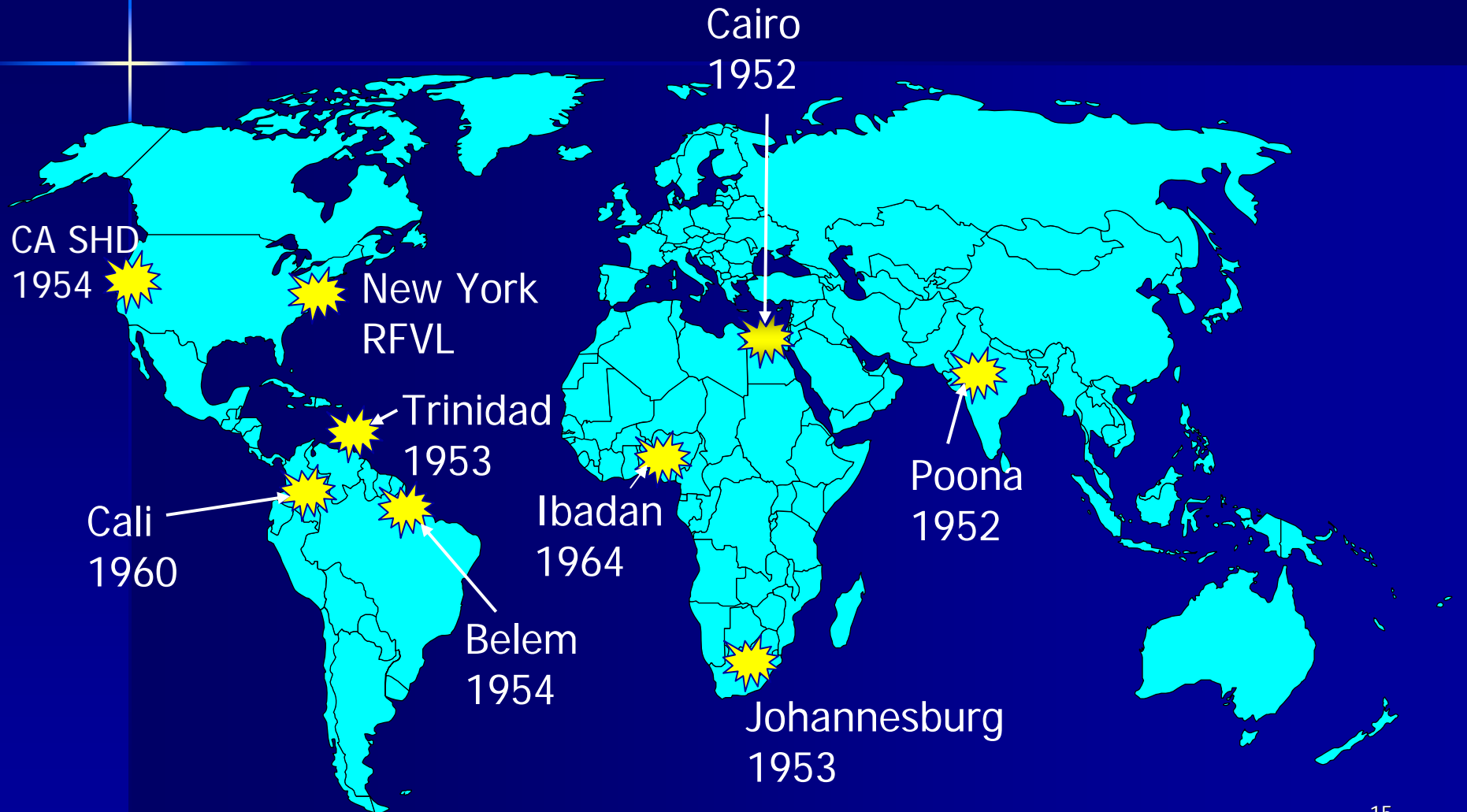
**THE ROCKEFELLER
FOUNDATION VIRUS PROGRAM:
1951-1971 WITH UPDATE TO 1981**

Wilbur G. Downs, M.D.

Department of Epidemiology and Public Health, School of Medicine, Yale
Arbovirus Research Unit, Yale University, New Haven, Connecticut 06510




Rockefeller Foundation Virus Program

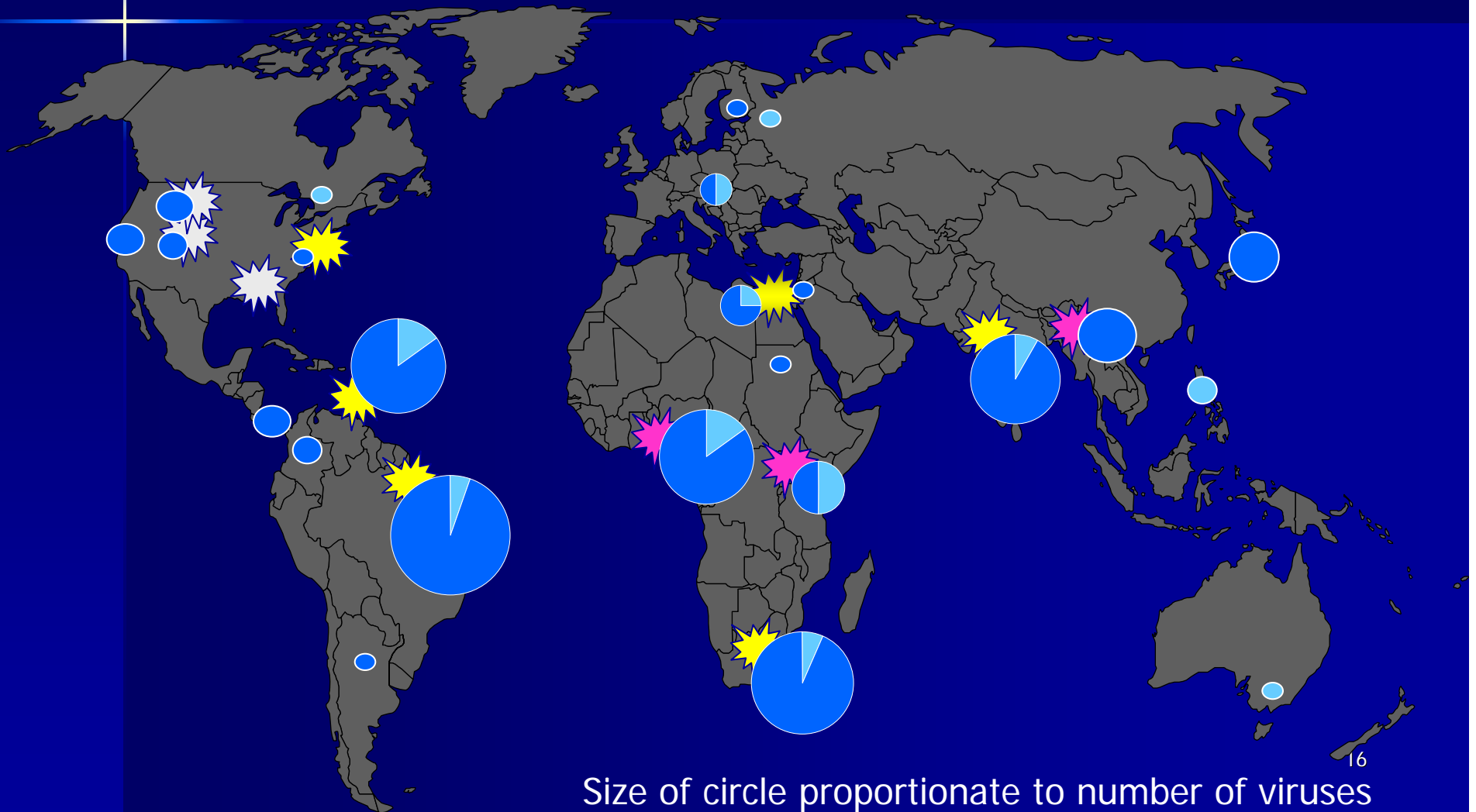
Period: 1951-71 Cost: \$30 million



New arboviruses 1950-71

Arthropod or vertebrate —  — human

-  Rockefeller Virus Lab
-  Medical Research Council lab (UK)
-  US Federal lab



Rockefeller virologists 1950s



T Aitken

H Trapido

C Causey

H Johnson

R Kokernot

O Causey

1952 West Nile in Egypt

Rockefeller Foundation Virus Laboratory

Telford Work MD

Richard Taylor MD

Veterinarians, zoologists and entomologists

Mosquito-borne (*Culex pipiens*) virus

WN lethal for crows

1999 WN virus in NYC

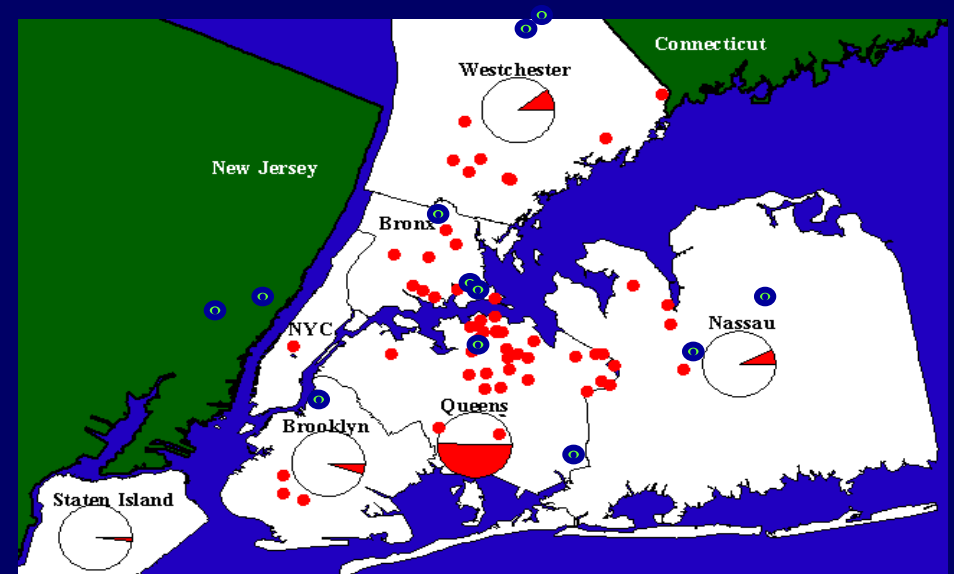
Tracy MacNamara DVM

Bronx Zoo

Disease in exotic birds

Deaths in wild crows

Cx. pipiens vector



Disease ecology: what have we lost and what should we do ?

- No longer training and producing 'renaissance man' scientists
- We can make up for specialization by combining efforts of multiple disciplines, e.g. One Health
- No serious support for disease ecology, funding for hypothesis driven research not "fishing expeditions"
- Increasingly onerous regulatory environment inhibits collaborations
- We must create new paradigms, funding, and regulations for disease ecology research
- Integrated multi-disciplinary approach
- You can't catch fish if you don't go fishing!

The facts

- Majority of emerging diseases are diseases or animals transmissible to humans
- Animal health critical to protein supply and food safety
- Genomics and pathogenesis of disease shared by animals and humans
- Prevention, diagnosis, and treatment of human and animal diseases utilize similar technologies
- Biodefense: Shared animal and human threat agenda
- Companion animals play an increasing role in human welfare

AVMA/AMA "One Health" Liaison



- June 2006, **Dr. Roger Mahr, President of AVMA** formed collaborative liaison with **Dr. Ron Davis, President-elect of AMA now President.**
- AVMA recently established 15 member task force to devise strategy for implementing "One Health."
- **AMA passed a "One Health" resolution June 2007.**

AMA Resolution 530 (A-07)

“Collaboration Between Human and Veterinary Medicine”

- RESOLVED, That our American Medical Association support an initiative designed to promote collaboration between human and veterinary medicine
- RESOLVED, That our AMA support joint educational efforts between human medical and veterinary medical schools
- RESOLVED, That our AMA encourage joint efforts in clinical care through the assessment, treatment, and prevention of cross-species disease transmission

AMA Resolution 530 (A-07) “Collaboration Between Human and Veterinary Medicine” *(cont.)*

- RESOLVED, That our AMA support cross-species disease surveillance and control efforts in public health
- RESOLVED, That our AMA support joint efforts in the development and evaluation of new diagnostic methods, medicines, and vaccines for the prevention and control of diseases across species

AMA Resolution 530 (A-07) “Collaboration Between Human and Veterinary Medicine” (*cont’d*)

- RESOLVED, That our AMA engage in a dialogue with the American Veterinary Medical Association to discuss strategies for enhancing collaboration between human and veterinary medical professions in medical education, clinical care, public health, and biomedical research

Supporters of One Health

- American Veterinary Medical Association
- American Medical Association
- American Society of Tropical Medicine & Hygiene
- American College of Preventive Medicine
- American College of Occupational and Environmental Medicine
- American Association of Public Health Physicians
- Academy of Pharmaceutical Physicians and Investigators
- American Society of Veterinary Tropical Medicine
- American Phytopathological Society
- World Association of Veterinary Laboratory Diagnosticians
- American Association of Veterinary Laboratory Diagnosticians
- Delta Society

Supporters of One Health

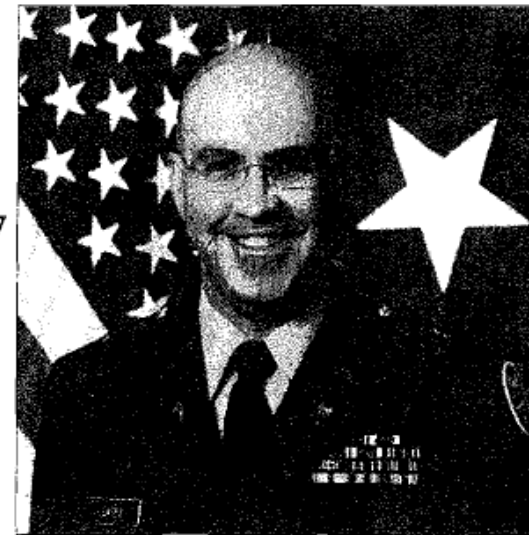
- 389 leading physicians, veterinarians, scientists and policy makers, leaders in Government, Academia, Education, Industry, Public Health
- Former PHS Surgeons General (Koop, Carmona)
- 3 Nobel Laureates
- Multiple members of the National Academy

Healthy Animals, Healthy People: Inextricably Linked

Brigadier General Michael B. Cates

Dogs and dolphins, monkeys and cats, horses and mules, rabbits, rodents, reptiles, and humans—multiple species, and all are part of the focused mission of the US Army Veterinary Corps. For over 91 years, officers in our Corps, along with support personnel, have been an integral part of the Army Medical Department, making critical global contributions toward the health of animals, as well as the health of Soldiers, Family members, and others. The US Army Veterinary Corps was formed in 1916 at a time when our country was just beginning to comprehend the relationship between animal and human health. We now know that those ties are tremendous. With extraordinary versatility and vigilance, our relatively small veterinary team of 3500 total personnel has continued its quest of the Army version of “One Medicine, One Health.”

ONE MEDICINE, ONE HEALTH



BG Cates is the Chief, Army Veterinary Corps; the Commanding General, US Army Center for Health Promotion and Preventive Medicine; and the Functional Proponent, US Army Preventive Medicine.

Army Medical Department Journal

July - September 2007



Lonnie King DVM

... a multidisciplinary strategy to prevent, control, and, where possible, eliminate infectious diseases within a larger ecological context that includes humans, animals, and plants interacting in a complex, ever-changing natural environment.

Emerging Pathogens Institute University of Florida

- Plant Diseases e.g. Citrus Canker, etc.
- Human Diseases e.g. Arboviruses, etc.
- Animal Disease e.g. Avian Influenza, etc.
- Food Safety e.g. *E. coli* 0157:H7

J. Glenn Morris, Jr., MD, MPH & TM
Director, Emerging Pathogens Institute
University of Florida
Gainesville, FL 32610 www.epi.ufl.edu

*January 2008

News:

Florida Department of Health

1st Issue-'One Health Newsletter'

Mary Echols, DVM, MPH, Editor

www.doh.state.fl.us/Environment/community/One_Health/OneHealth.html

Some Real-World Examples

- Pet dogs sickened with lead poisoning alerted physicians to the risk of lead poisoning in children sharing the household.

Dowsett R, Shannon M . Childhood plumbism identified after lead poisoning in household pets. N Engl J Med 1994;331:1661-2

- Cases of cancer in dogs linked to exposure to household carcinogens, providing clues to human cancer risks

Bukowski JA, et al. Environmental causes for sinonasal cancers in pet dogs, and their usefulness as sentinels of indoor cancer risk. J Toxicol Environ Health A 1998;54:579-91

- Cancers in dogs similar to human cancers.

Waters DJ, Wildasin K. Cancer clues from pet dogs. Sci Am. 2006;295:94-101.

Case Study: A Biotechnology Company developing novel immunomodulators for human medicine

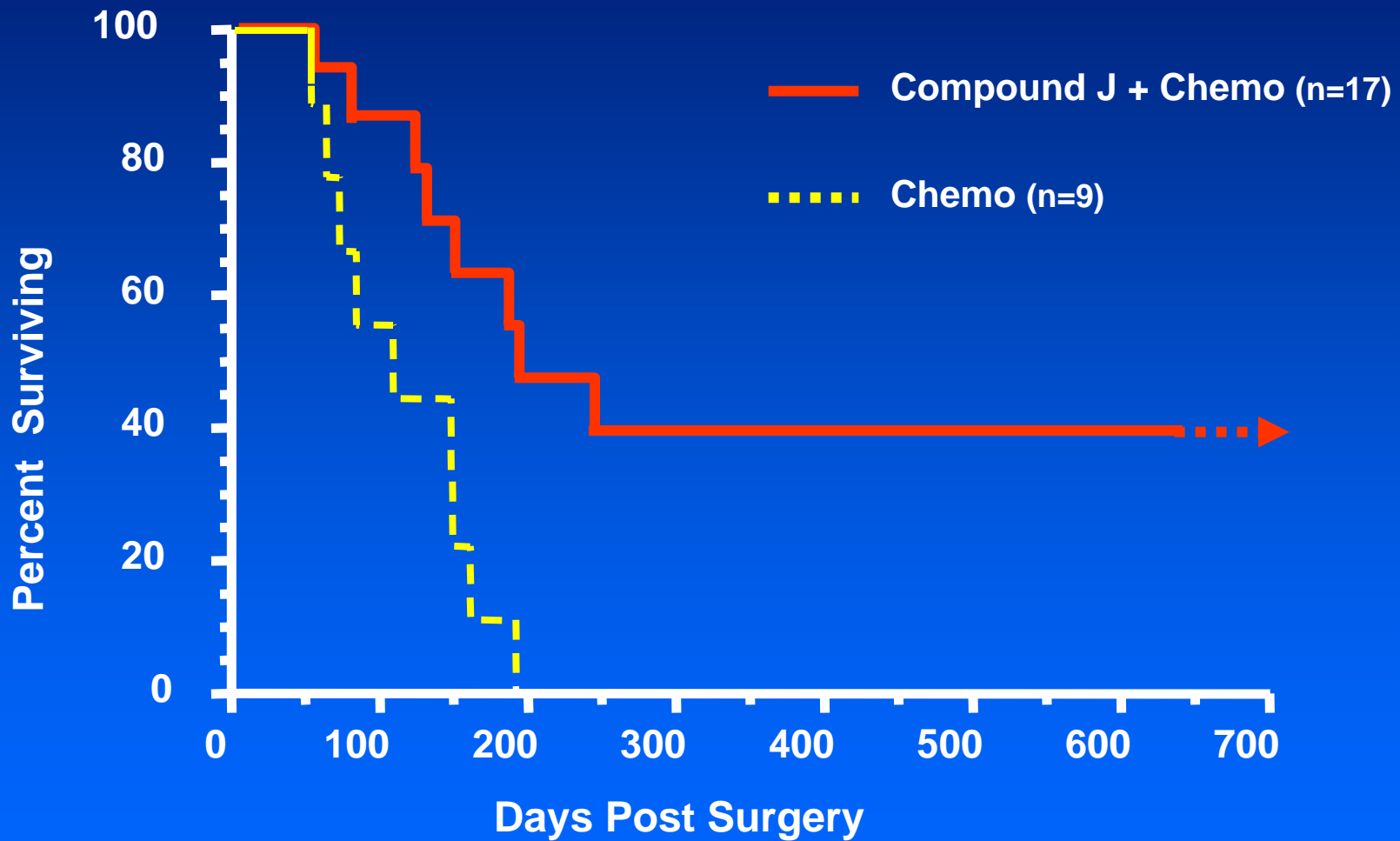
- Human vaccine adjuvants
- Immunotherapy for chronic viral infection of humans (e.g. HCV) and cancer
- Biodefense applications (pre and post-exposure prophylaxis)
- Commitment to exploring activity in animal models *and animal patients*

Therapeutic Treatments Utilizing Compound J

Spontaneous disease	Species	Vet School
Melanoma	Dog	CSU
Hemangiosarcoma	Dog	“
Osteosarcoma	Dog	“
Systemic fungal infection	Dog	“
Allergic rhinitis	Cat	“
Toxoplasmosis	Dog	“
Hepatitis	Woodchuck	Cornell

Cancer

Dogs with naturally-occurring Hemangiosarcoma

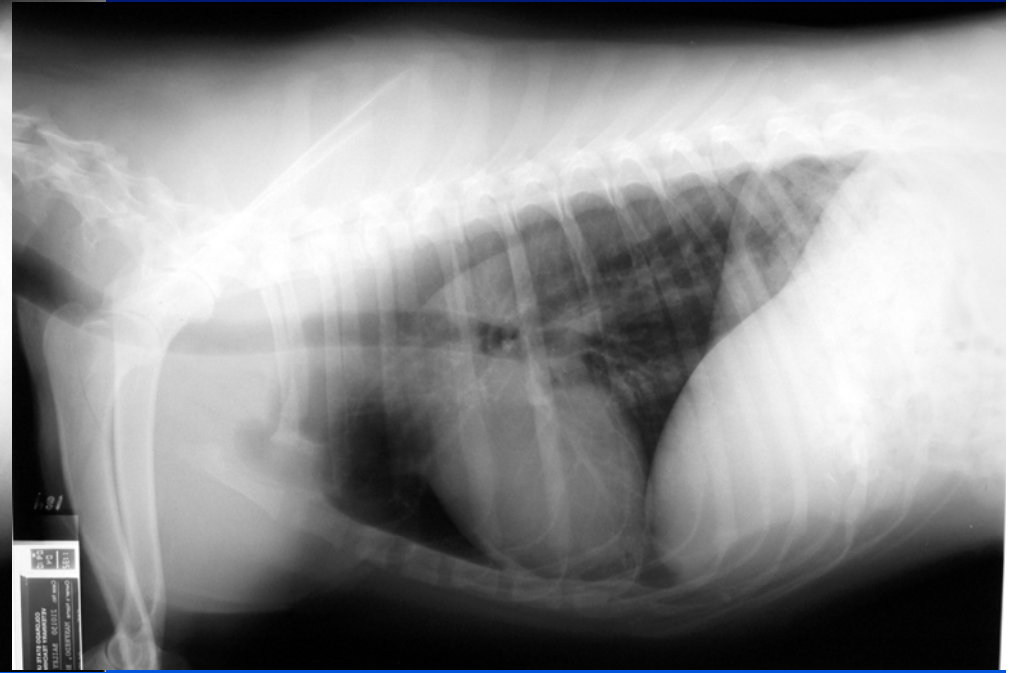
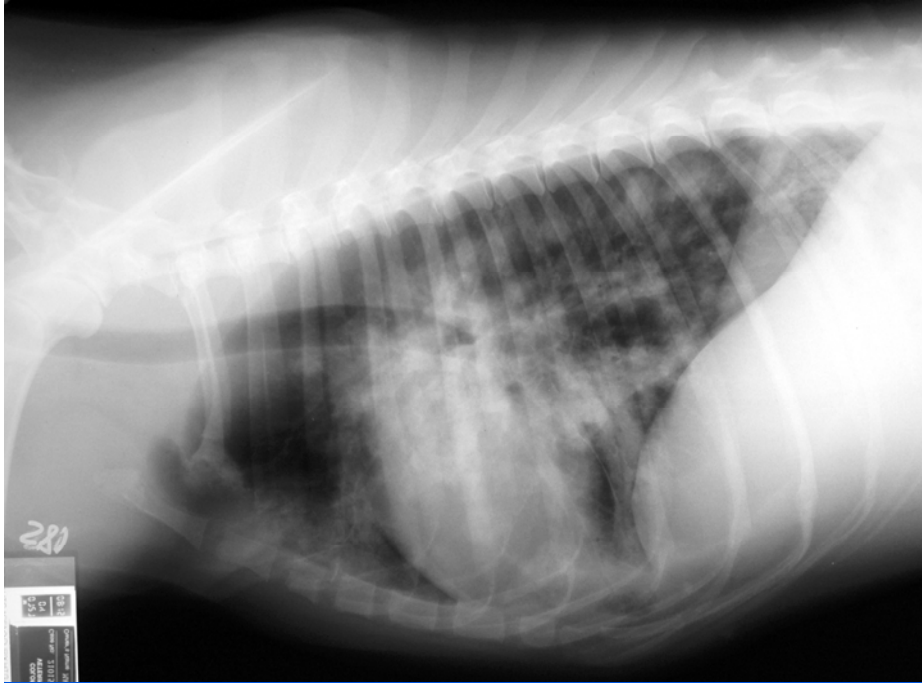


Treatment of a Dog with Severe *Toxoplasma gondii*

- Diagnosis of Disseminated *Toxoplasma gondii* Infection (3 mos prior):
- Failed to respond to repeated antibiotic treatments
- Findings:
 - Failure of CD4 expression on T cells and PMN
 - Decrease in IgG
 - Progressive worsening of lung disease and lesions
- Treatment:
 - Compound J weekly (3 weeks), decrease to every other week (2X), then once a month (2X)

Before Treatment

2 mo. after treatment



- **Clearance of Toxoplasma**
- **Restoration of CD4 Expression**
- **Normalized IgG levels**

**Bayer HealthCare and [REDACTED]
announce major licensing agreement**

Broad-based alliance to develop products for a wide range of animal species

March 8, 2008

In commenting on behalf of Bayer, Joerg Ohle, President and General Manager of Bayer Animal Health said, "This technology dramatically expands our ability to develop products that promote immune stimulation and disease prevention to protect animals and benefit people. **This is a great example of the principle of One Health at work**"



U.S. Food and Drug Administration

- 2004 **Critical Path Initiative** on product development bottlenecks
- Improved tools for evaluating safety and effectiveness of veterinary and human products.
- Rapid tests for biological and chemical contamination of animal-derived foods.
- Improved safety and nutritive value of foods, food ingredients, and feeds.
- Cross-disciplinary scientific review to appropriately assess genetic engineering and animal cloning.
- New technologies to reduce pathogens in animal products e.g. reduction of *E. coli* O157:H7 in cattle
- "The One Health Initiative is a unique opportunity to further advance collaboration between human and veterinary medicine for the benefit of people, animals and their environment. As a physician and regulator, I believe joining forces with partners with a wide range of expertise is absolutely essential in helping to smooth the path of discovery for quality health care products and safe foods for the public and the animals under our care."
Commissioner of Food and Drugs Andrew C. von Eschenbach, M.D.

Initiative Aims to Merge Animal and Human Health Science to Benefit Both

Medical and veterinary science are like siblings who have grown apart. But now, there's a flurry of efforts to reunite them. Proponents of this idea, called "one medicine" or "one health," say that breaking down the walls between the two fields will help fight diseases that jump from animals to humans, such as SARS and avian influenza, and advance both human and animal health.

In April, the American Veterinary Medical Association (AVMA) decided to establish a 12-member task force to recommend ways in which vets can collaborate

rural areas, versus more than 140, mostly urban-based, schools of medicine.

The benefits of collaboration could go beyond zoonoses, says Jakob Zinsstag of the Swiss Tropical Institute in Basel. For instance, in Chad, Zinsstag has helped

introduce joint vaccination campaigns for livestock and humans, which has helped

raise vaccination rates of hard-to-reach nomadic populations. In the United Kingdom,

It's all connected. Human and animal medicine should grow closer together, One Health supporters say.



W Potential of cooperation between human and animal health
to strengthen health systems **Lancet 2005;366:2142**

Jakob Zinsstag, Esther Schelling, Kaspar Wyss, Mahamat Bechir Mahamat

**'One medicine—one pathology': are veterinary and
human pathology prepared?**

Lab Invest 2008;88:18

Robert D Cardiff^{1,2}, Jermold M Ward³ and Stephen W Barthold^{1,2,4}

Teaching "One Medicine, One Health"

Laura H. Kahn, MD, MPH, MPP, FACP
*Program on Science and Global Security
Woodrow Wilson School of Public and International Affairs
Princeton University
Princeton, NJ*
Bruce Kaplan, DVM
Sarasota, Fla
Thomas P. Monath, MD
*Kleiner Perkins Caufield & Byers
Pandemic & Bio-defense Fund
Harvard, Mass*
James H. Steele, DVM, MPH
*University of Texas School of Public Health
Houston, Tex*

Am J Med 2008;121:169

**Confronting zoonoses through closer collaboration
between medicine and veterinary medicine (as 'one
medicine')**

Vet Ital 2007;43:5

Laura H. Kahn⁽¹⁾, Bruce Kaplan⁽²⁾ & James H. Steele⁽³⁾

Some major potential outcomes of “One Health”

- Broader scope and strengthening of medical and veterinary education
- Improved prevention and management of patients at risk of zoonotic infections
- Integrated surveillance: improved early recognition and control of zoonoses
- Integrated vaccination campaigns: improved coverage rates in developing world
- Improved knowledge of common chronic diseases (e.g. obesity, cancer) affecting animals and humans
- Integrated biomedical research: improved development of diagnostics, therapeutics, devices
- Facilitated regulatory assessments

The Next Steps

- AVMA Task Force for One Health
- Consolidate into a broad coalition
- Create a roadmap for implementation and sustainable change
- This is a BIG IDEA that requires BIG SOLUTIONS