

EMERGING MOSQUITO BORNE DISEASES

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INTRODUCTION

- ❖ What is an emerging disease?
- ❖ Causes
 - International Travel
 - Climate Change
 - Introduction of new mosquito species
- ❖ Emerging Diseases
 - Saint Louis Encephalitis
 - Chikungunya
- ❖ Conclusions



EMERGING INFECTIOUS DISEASE

- ❖ Disease that has newly appeared in a population
- ❖ Rapidly increasing in incidence
- ❖ Rapidly increasing geographic range



CAUSES

- ❖ Movement of people
- ❖ Environment
 - Global warming
 - Introduced species
 - Changes in land use
- ❖ Mutations
 - Drug resistance
 - Antigenic drift and shift



CLIMATE CHANGE

- ❖ Changes in precipitation
- ❖ Temperatures affect
 - Warm weather increases virus replication
 - Behavior
 - Mortality
 - Rate of development
- ❖ Geographic Distribution - species are predicted to move northward

EXOTIC MOSQUITO SPECIES

Ae. albopictus
Arrived 1985

Oc. japonicus
Arrived 1998



EXPANSION OF *AE. ALBOPICTUS*

Asian Tiger Mosquito

- ◉ Container breeder
- ◉ 1st identified at a tire dump in Houston, TX 1985
 - NJ 1995
- ◉ Most often transported in discarded tires
- ◉ Daytime Biter- Severe nuisance
- ◉ Limited flight range- 100m - 200m
- ◉ Good vector for many diseases
- ◉ Found in 3 places in MA

NEW BEDFORD COLLECTIONS

- 2000- 18
- 2009- 3
- 2010- 2
- 2011- 34
- 2012- 169
 - Highest collections in August
 - 8/24- 50



CHIKUNGUNYA



**COUNTRIES WITH REPORTED HUMAN
CHIKUNGUNY VIRUS INFECTIONS AS
OF MAY 2012**



CHIKUNGUNYA

- ❖ Genus: Alphavirus
 - Family: Togaviridae
- ❖ Epidemics reported in 1770's
- ❖ First isolated in Tanzania in 1952
- ❖ Makonde word means "that which bends"
- ❖ Infection rates 38 - 63% of population
- ❖ Incubation period 1-12 days (average 3-7 days)
- ❖ 3-28% of infected people are asymptomatic
- ❖ Death is uncommon

CHIKUNGUNYA

- ❖ Since 2004 Chikungunya has expanded its geographical range
- ❖ Travelers have spread it to 19 countries
- ❖ Unprecedented epidemics
- ❖ Number of imported cases to the US has increased
 - 2006-2010 - 106 cases
 - 1995-2005 - 3 cases
- ❖ Vectors have wide spread distribution
 - *Aedes aegypti*
 - *Ae. albopictus*

SYMPTOMS

- ❖ High fever
- ❖ Severe joint pain (hands and feet)
- ❖ Headache
- ❖ Diffuse back pain
- ❖ Muscle pain
- ❖ Nausea
- ❖ Vomiting
- ❖ Polyarthrititis
- ❖ Rash
- ❖ Conjunctivitis



PERSISTENT SYMPTOMS

- ❖ Percentage of people with chronic disease varies substantially between studies
- ❖ Symptoms can last months to years after
- ❖ Inflammatory arthralgias
- ❖ Destructive arthritis (resembles rheumatoid arthritis)
- ❖ Fatigue
- ❖ Depression
- ❖ People over 45 at greater risk

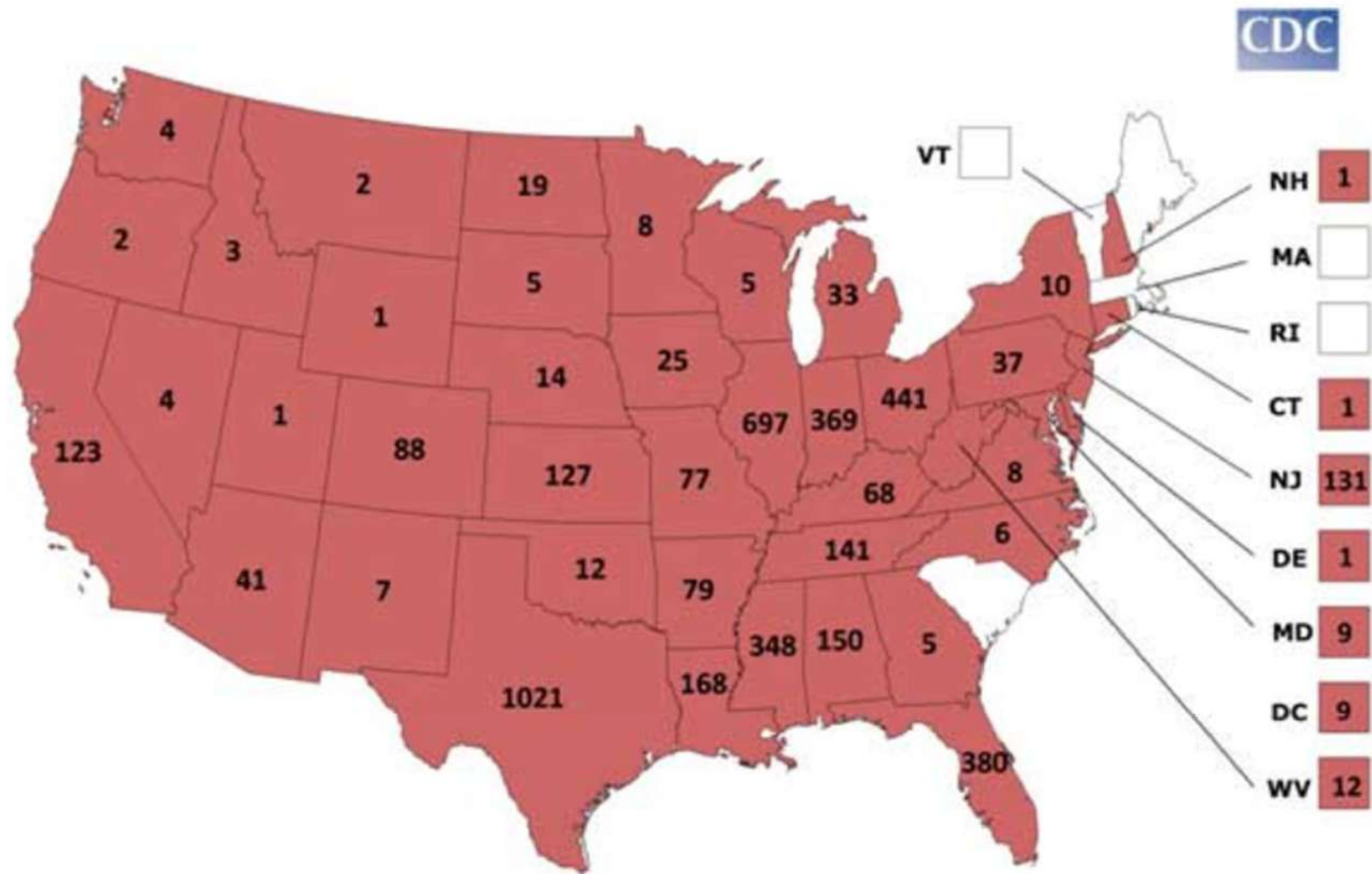
LA RÉUNION ISLAND

- ❖ French island east of Madagascar
- ❖ 2005-2006
- ❖ Infected 35% of population 266,000 people
- ❖ 254 deaths
- ❖ 47% of people with persistent symptoms 2 years after
- ❖ Virus mutation made *Ae. albopictus* better able to transmit

SAINT LOUIS ENCEPHALITIS

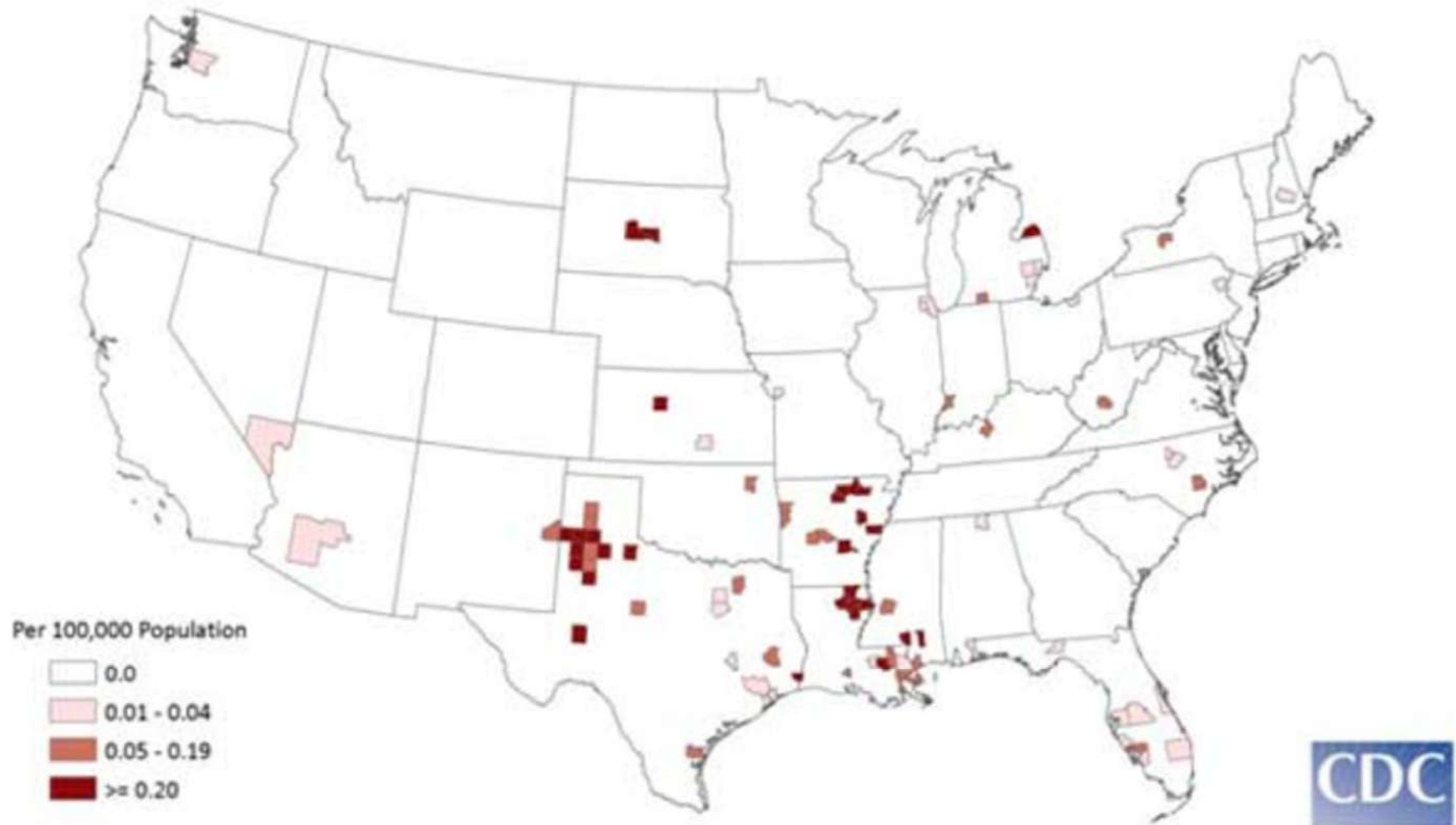


St. Louis Encephalitis Virus Neuroinvasive Disease Cases* Reported by State, 1964-2010



* Neuroinvasive disease includes cases reported as encephalitis, meningoencephalitis, or meningitis.

St. Louis Encephalitis Virus Neuroinvasive Disease Average Annual Incidence by County, 1996-2010



**Neuroinvasive disease includes cases reported as encephalitis, meningoencephalitis, or meningitis*

SAINT LOUIS ENCEPHALITIS

- ❖ Genus: Flavivirus
 - Family: Flaviviridae
- ❖ First recognized in 1933 during an outbreak in St. Louis
 - 1,095 cases and 201 deaths
- ❖ Majority of human cases east of Mississippi
- ❖ Most human infections are asymptomatic
- ❖ Vectors are Culex mosquitoes

ST. LOUIS ENCEPHALITIS

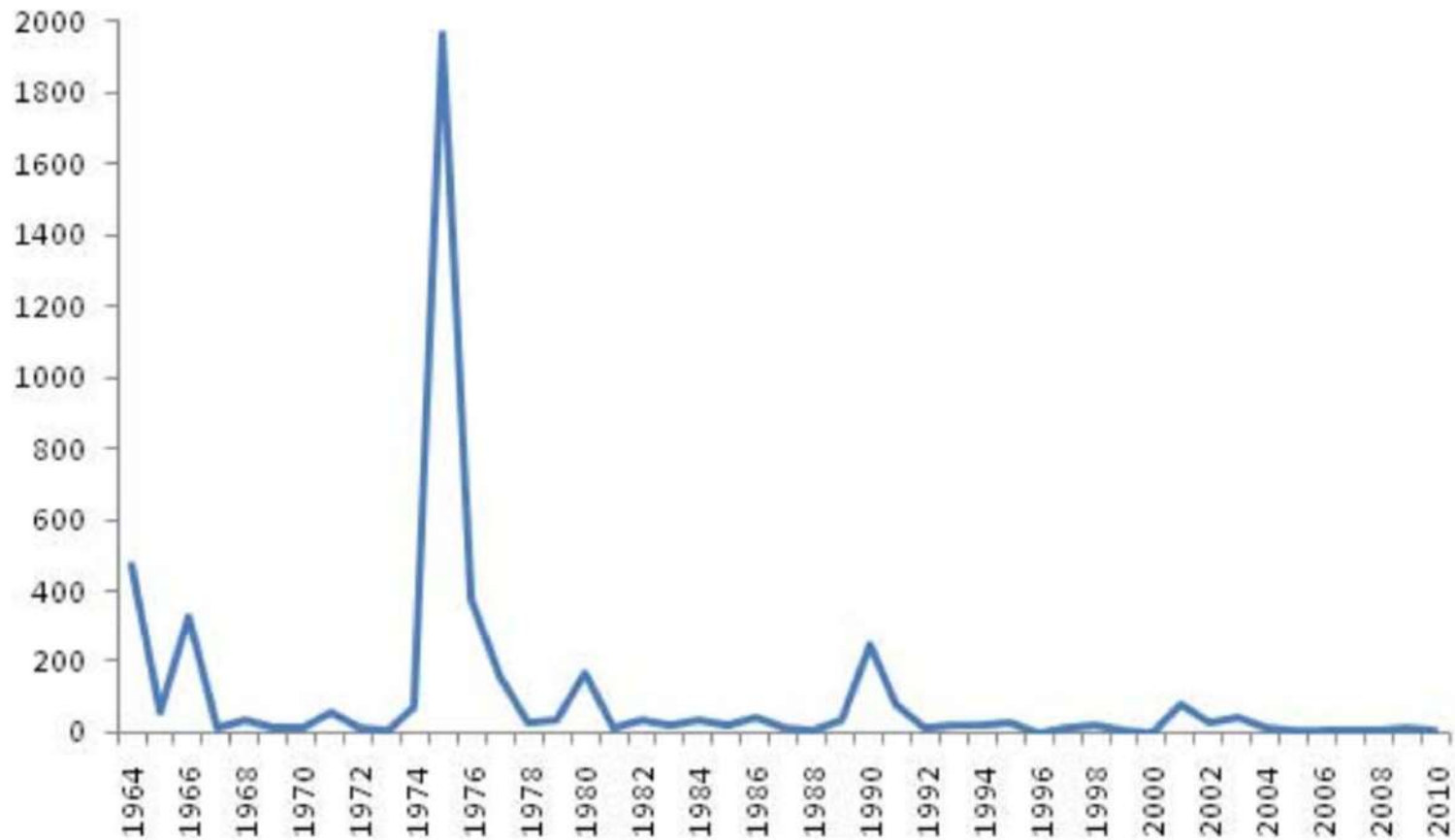
SYMPTOMS

- ❖ Less than 1% of infected people will have symptoms
- ❖ Incubation period 5-15 days
- ❖ Headaches
- ❖ Flu-like illness
- ❖ Muscle aches and weakness
- ❖ Vomiting
- ❖ Encephalitis or Meningitis
- ❖ Confusion
- ❖ Coma
- ❖ Death

SAINT LOUIS ENCEPHALITIS VIRUS CYCLE



St. Louis Encephalitis Virus Neuroinvasive Disease Cases* Reported by Year, 1964-2010



**Neuroinvasive disease includes cases reported as encephalitis, meningoencephalitis, or meningitis.*

CONCLUSIONS

- ❖ Diseases constantly changing
- ❖ Introduced mosquitoes change what diseases we are susceptible to
- ❖ Chikungunya
- ❖ Saint Louis Encephalitis



THANKS

❖ Priscilla Matton

