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CNS Viral Infections

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- Expert on infectious and immune-mediated disorders of the nervous system, including multiple sclerosis



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Section A

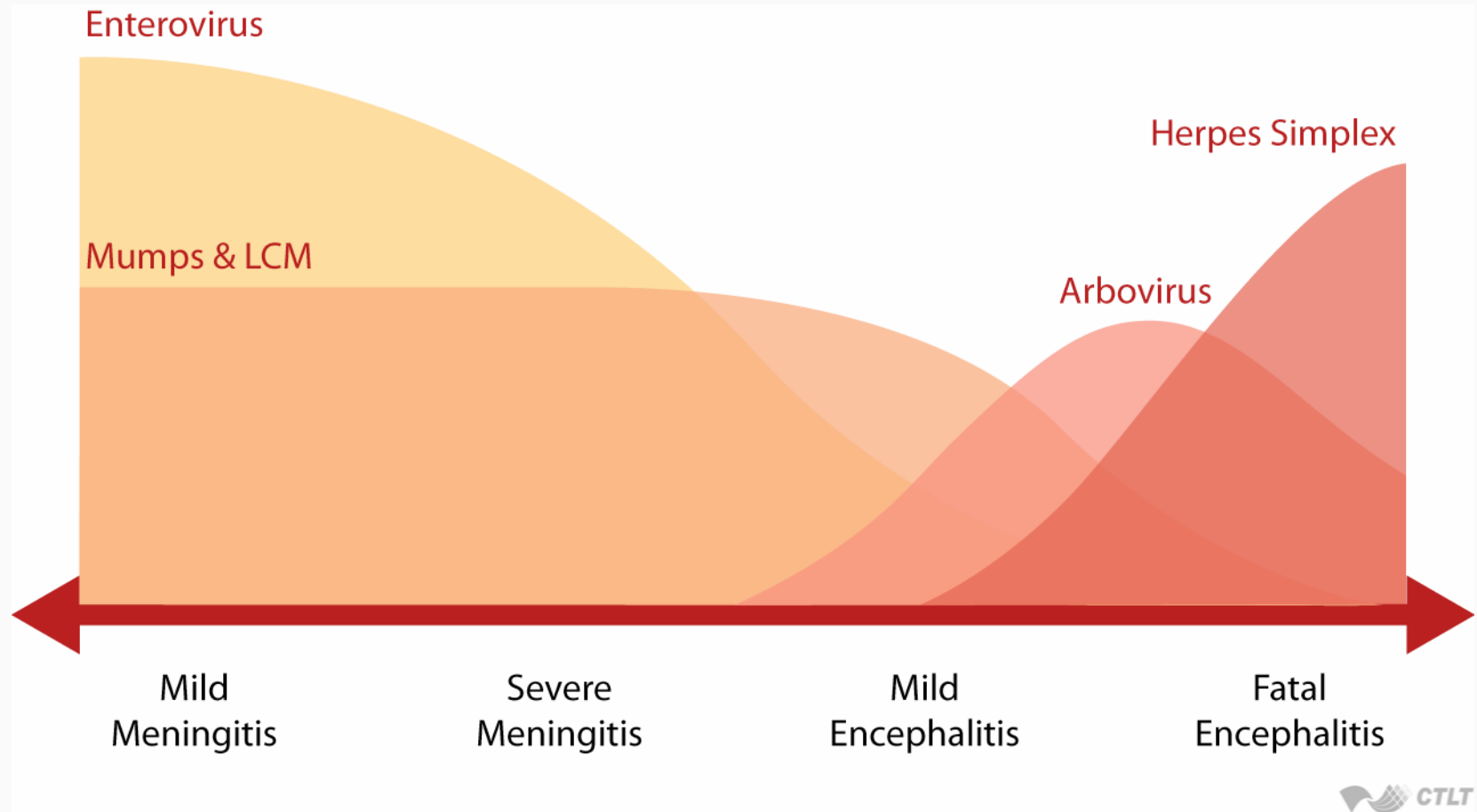
Meningitis and Encephalitis

- Syndromes of aseptic meningitis, encephalitis and flaccid paralysis (poliomyelitis)
- Most represent uncommon complications of common systemic infections
- Over 100 etiologic agents (some are not viruses)
- Spectrum of agents and syndromes overlap
- Most IMPORTANT:
 - Rule out non-viral causes that require specific treatment
 - Do not miss herpes simplex encephalitis, which has highly effective treatment

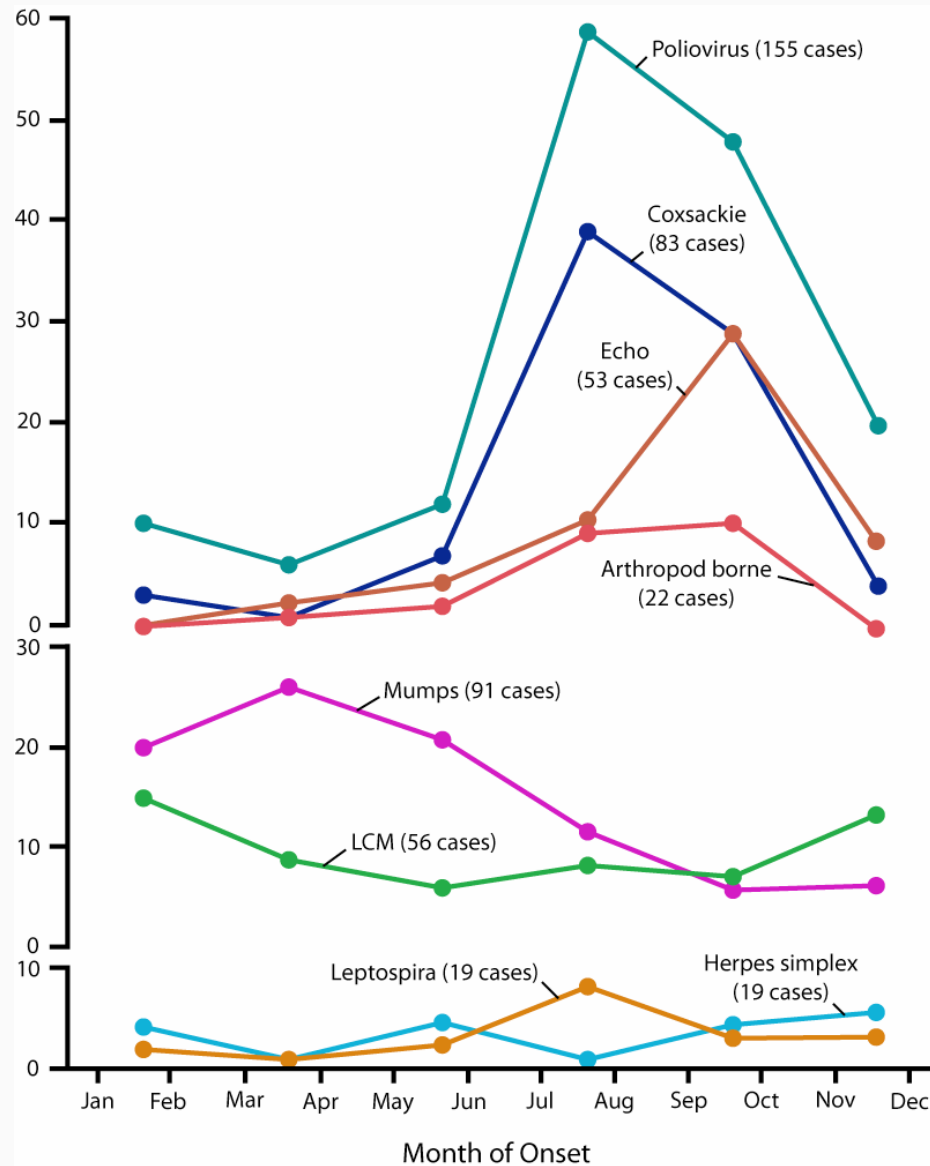
Viruses

- Enteroviruses 40%
- Mumps 15%
- Lymphocytic choriomeningitis 5%
- Other 10%
- Unknown 30%

Viruses and Severity of Disease



Seasonal Distribution



Mistakes about Poliomyelitis

- Olfactory spread—mistake of translational research
- Flies as vectors
- Swimming pools

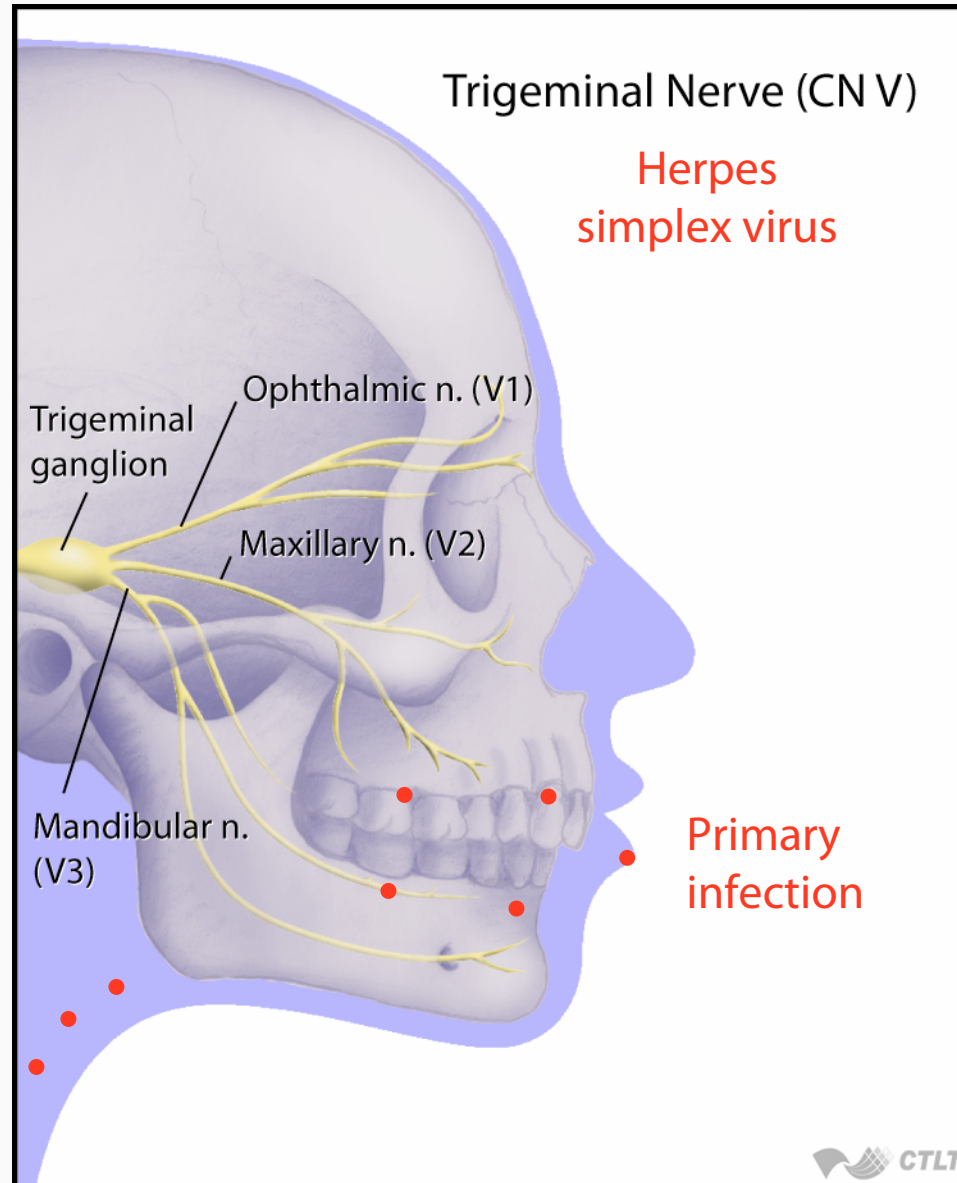
Epidemiology of Enteroviruses

- Hand to mouth transmission
- Role of children and family
- Causes of “nonparalytic polio”

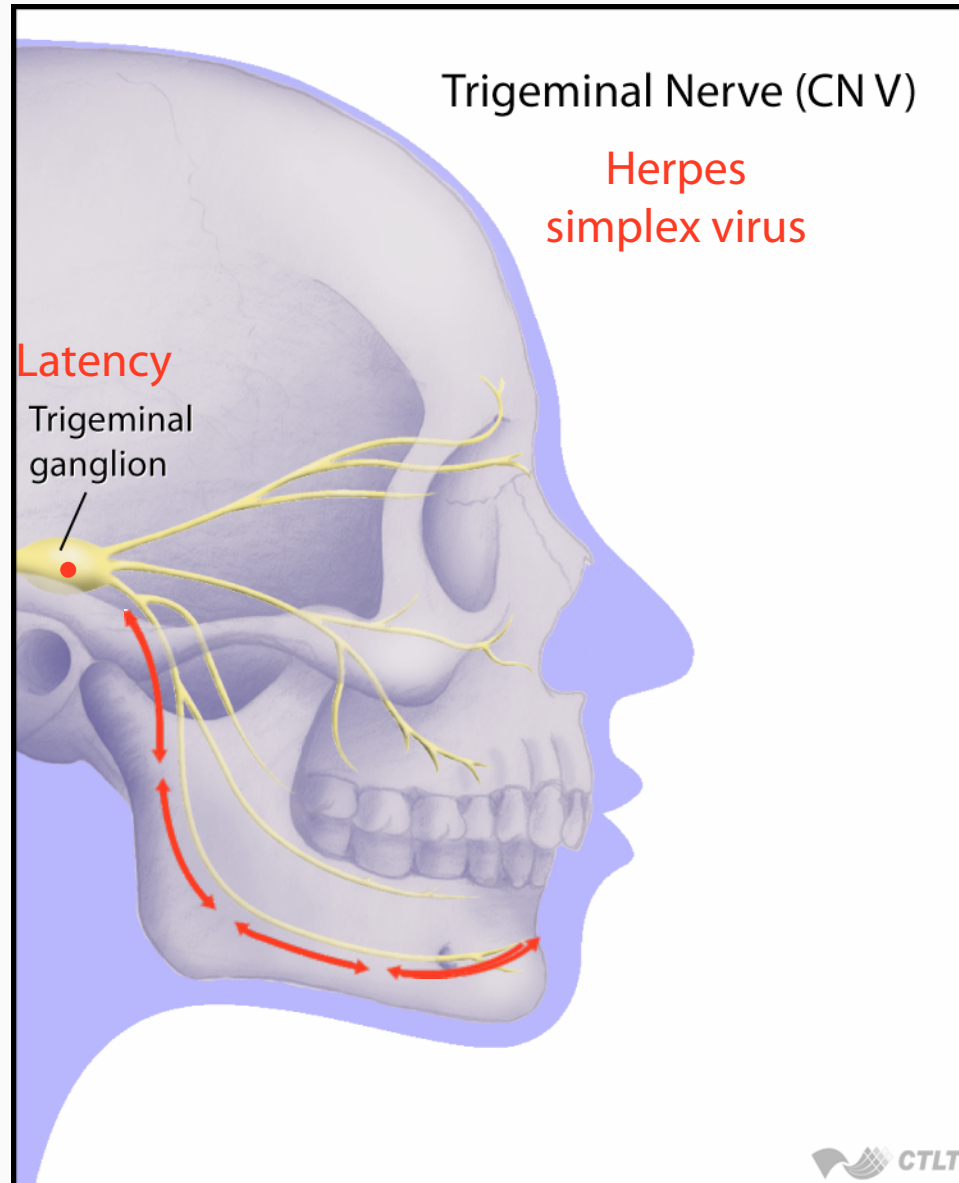
Severe and Fatal Encephalitis

- Arthropod-borne viruses
- Herpes simplex viruses

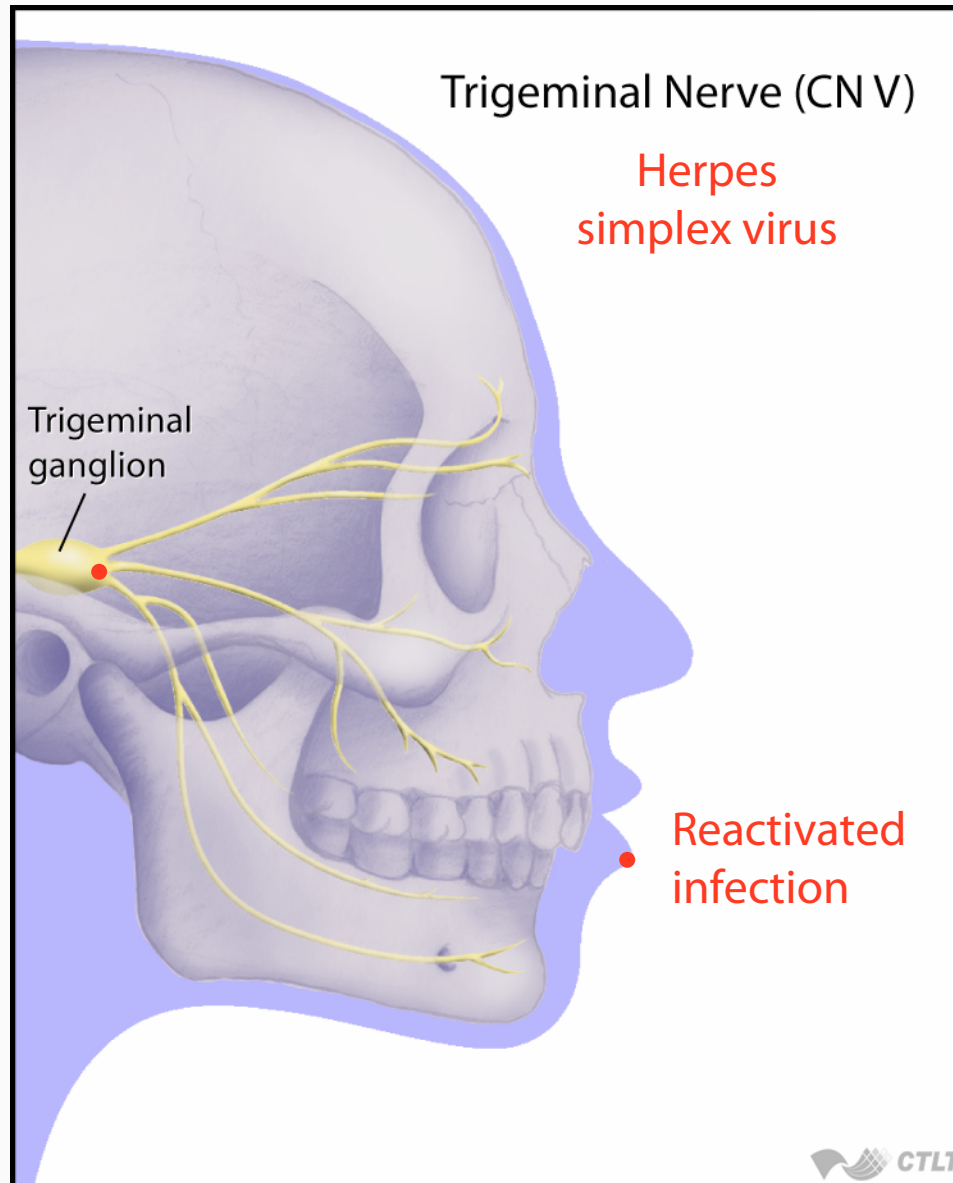
Herpes Simplex Virus



Herpes Simplex Virus



Herpes Simplex Virus





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Section B

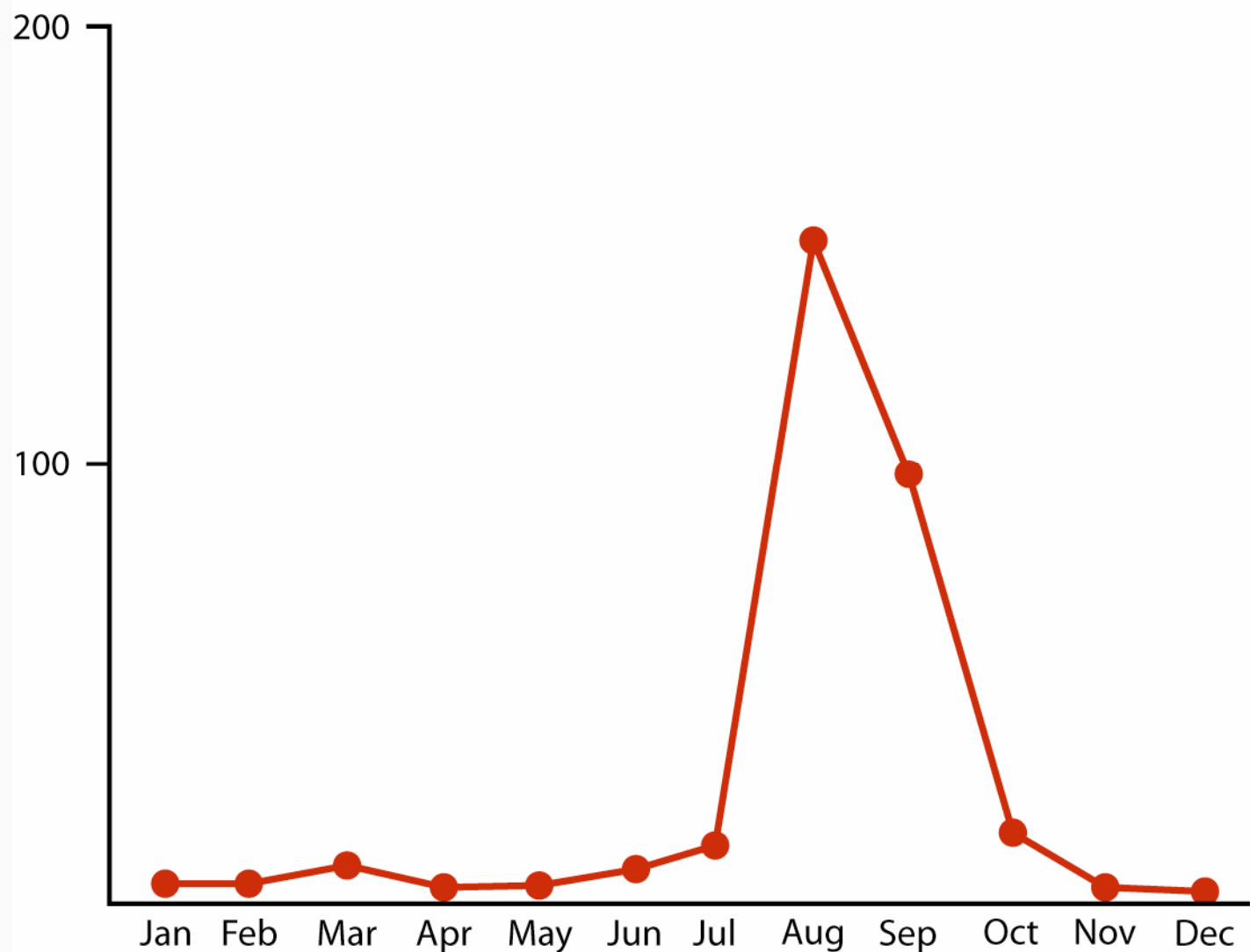
Arthropod-borne Viruses

Arthropod-borne Viruses = Arboviruses

- Biological transmission with infectious cycle in arthropod
vs.
- Mechanical transmission with contaminated extremities or mouthparts

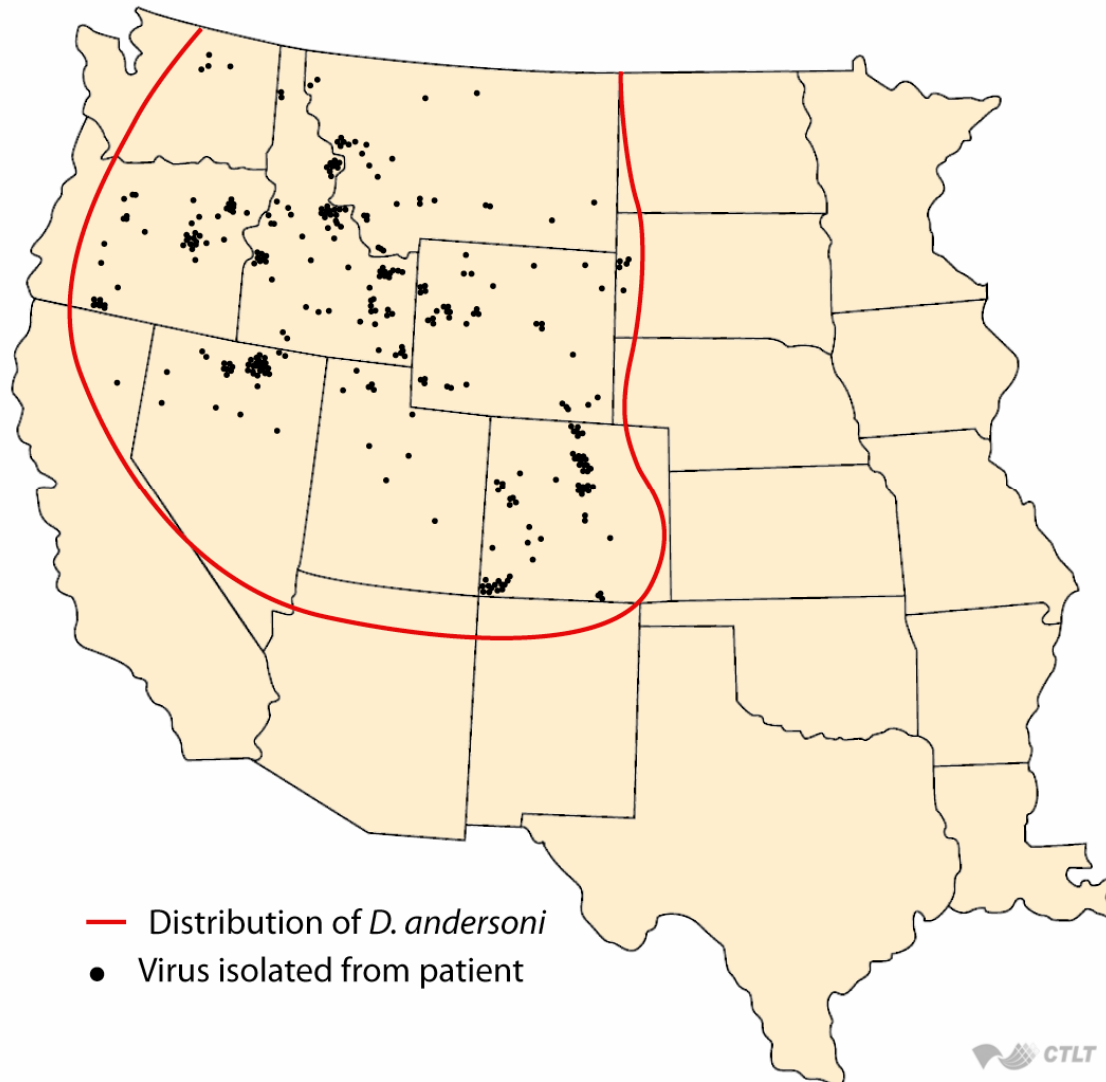
Occurrence of Arthropod-Borne Encephalitis

Seasonal Occurrence of Arthropod-Borne Encephalitis



Colorado Tick Fever Virus

Distribution of *Dermacentor andersoni* ticks and patients from whom Colorado tick fever virus was isolated in western U.S.A.





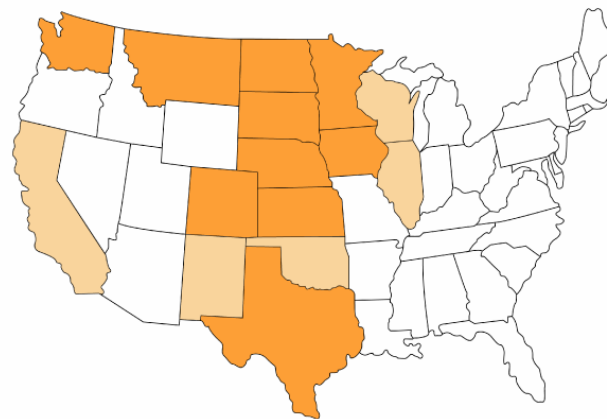
Source: CDC PHIL

Geographic Distribution of Arbovirus Encephalitis

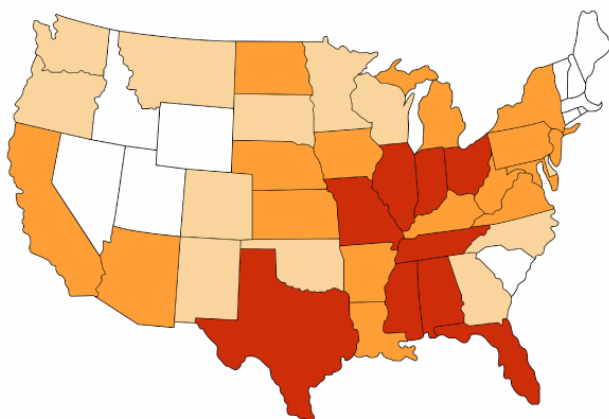
Eastern Encephalitis



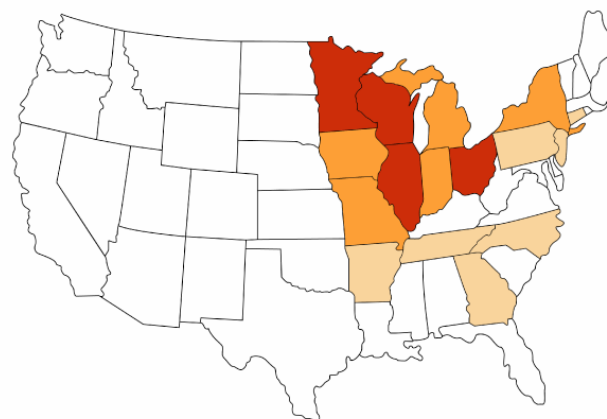
Western Encephalitis



St. Louis Encephalitis

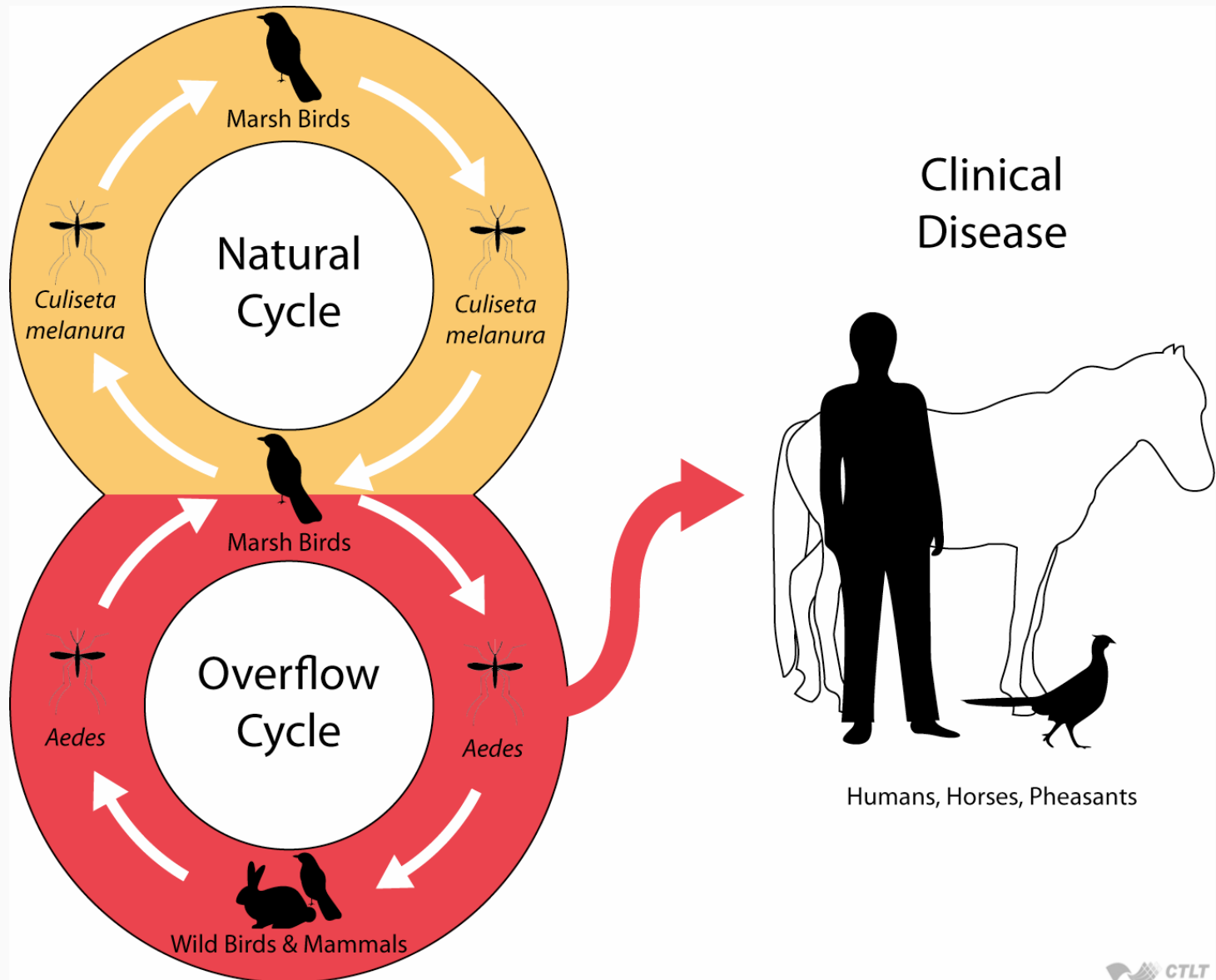


California Encephalitis



Number of Cases: 1-4 5-50 50+

Eastern Encephalitis Virus

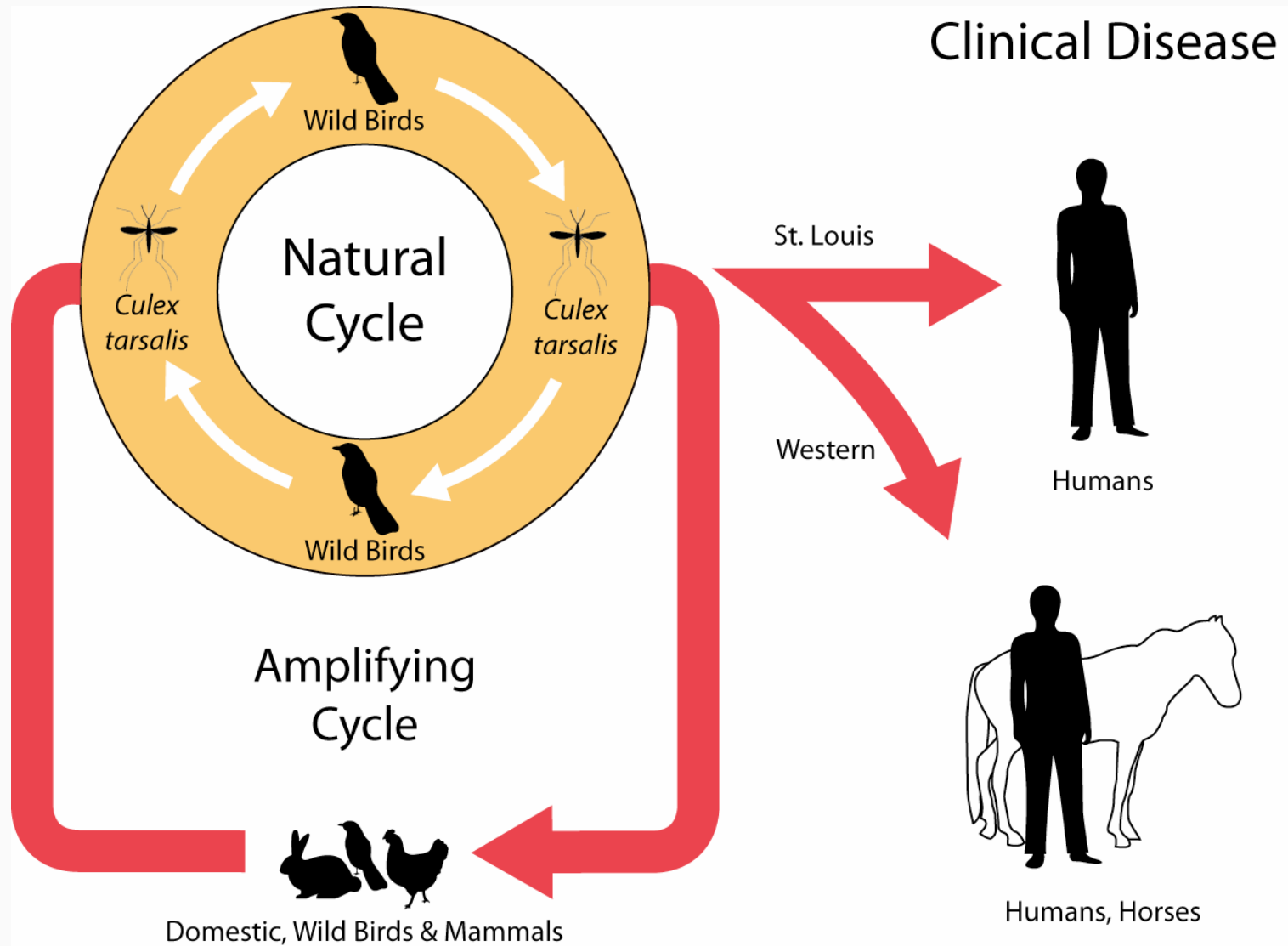


Equine Death from Viral Encephalitis

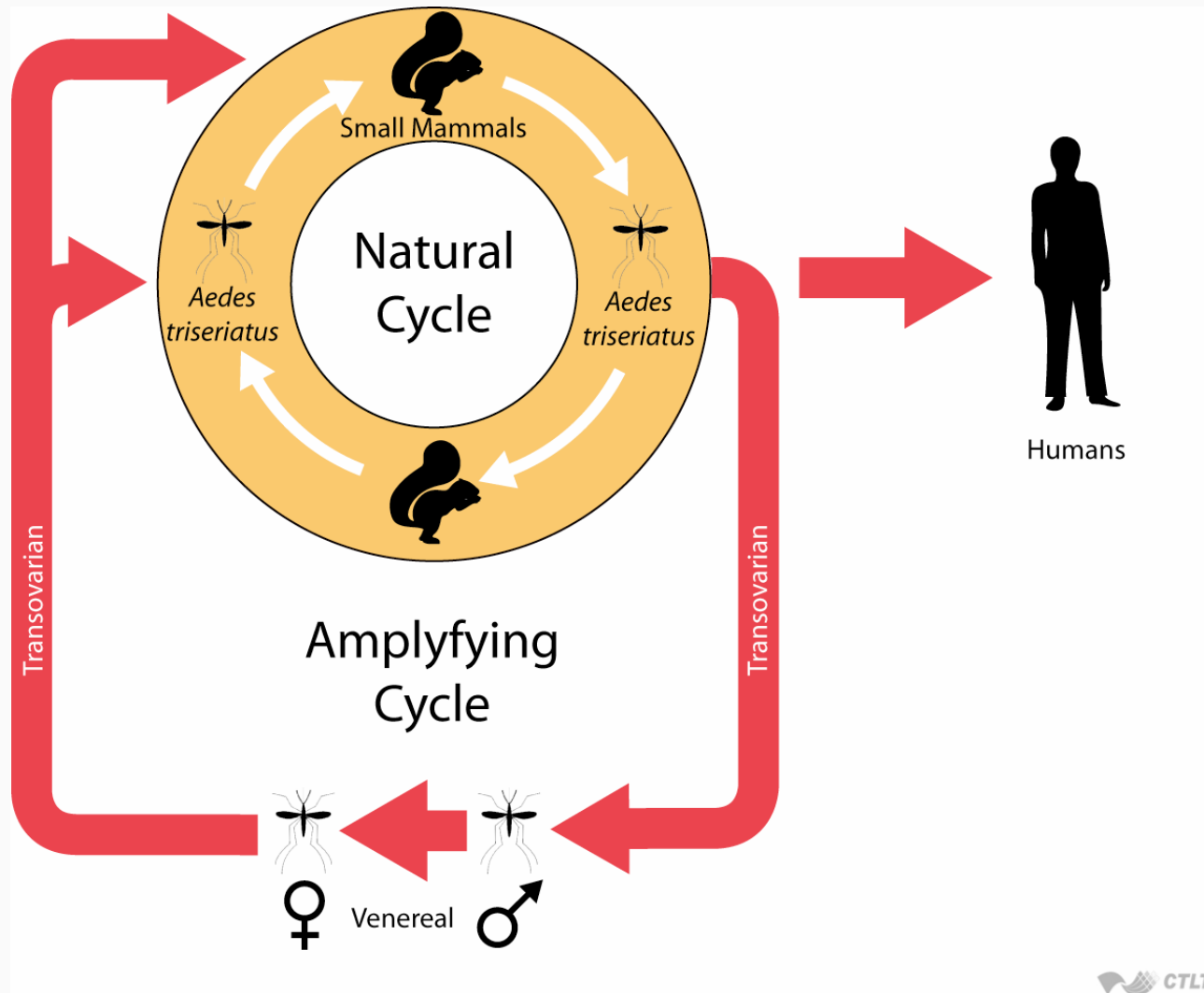


Source: CDC

St. Louis and Western Encephalitis



California Encephalitis



Tree Hole



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Man-Made Breeding Places

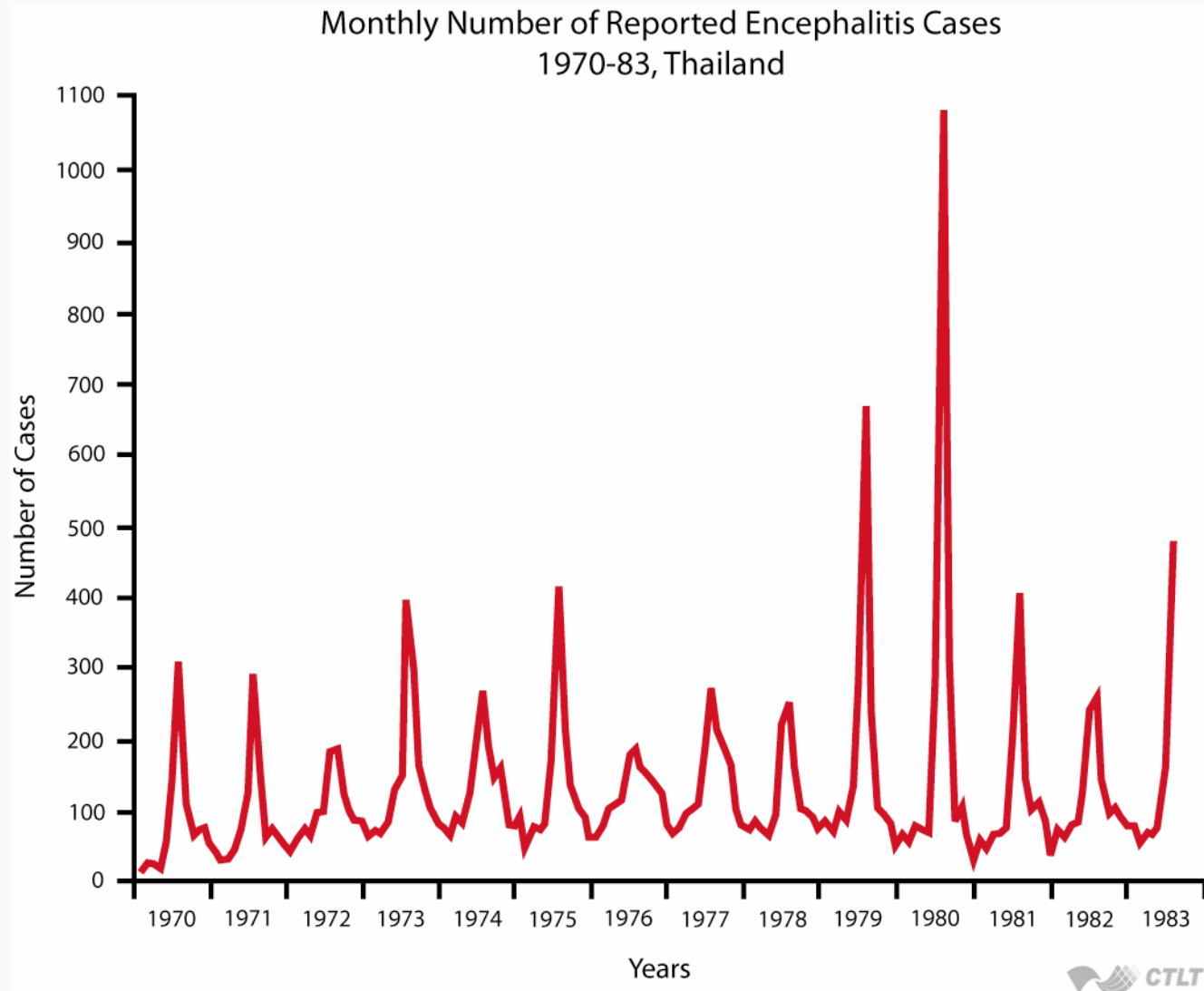


Photo by [bondidwhat](#). [Some rights reserved](#).

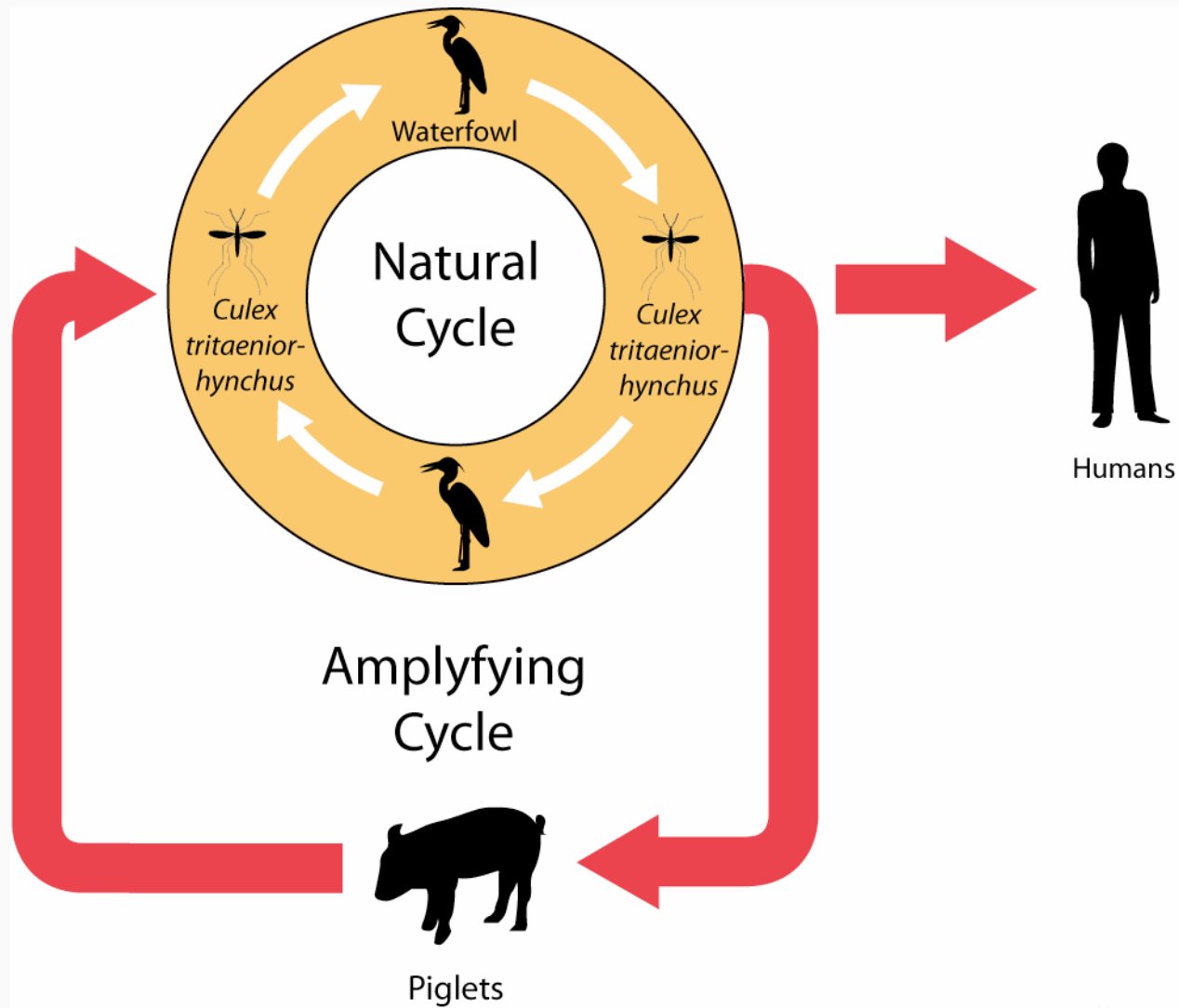
Regions Reporting Japanese Encephalitis



Encephalitis Cases Reported Monthly: Thailand, 1970–83



Japanese Encephalitis Virus

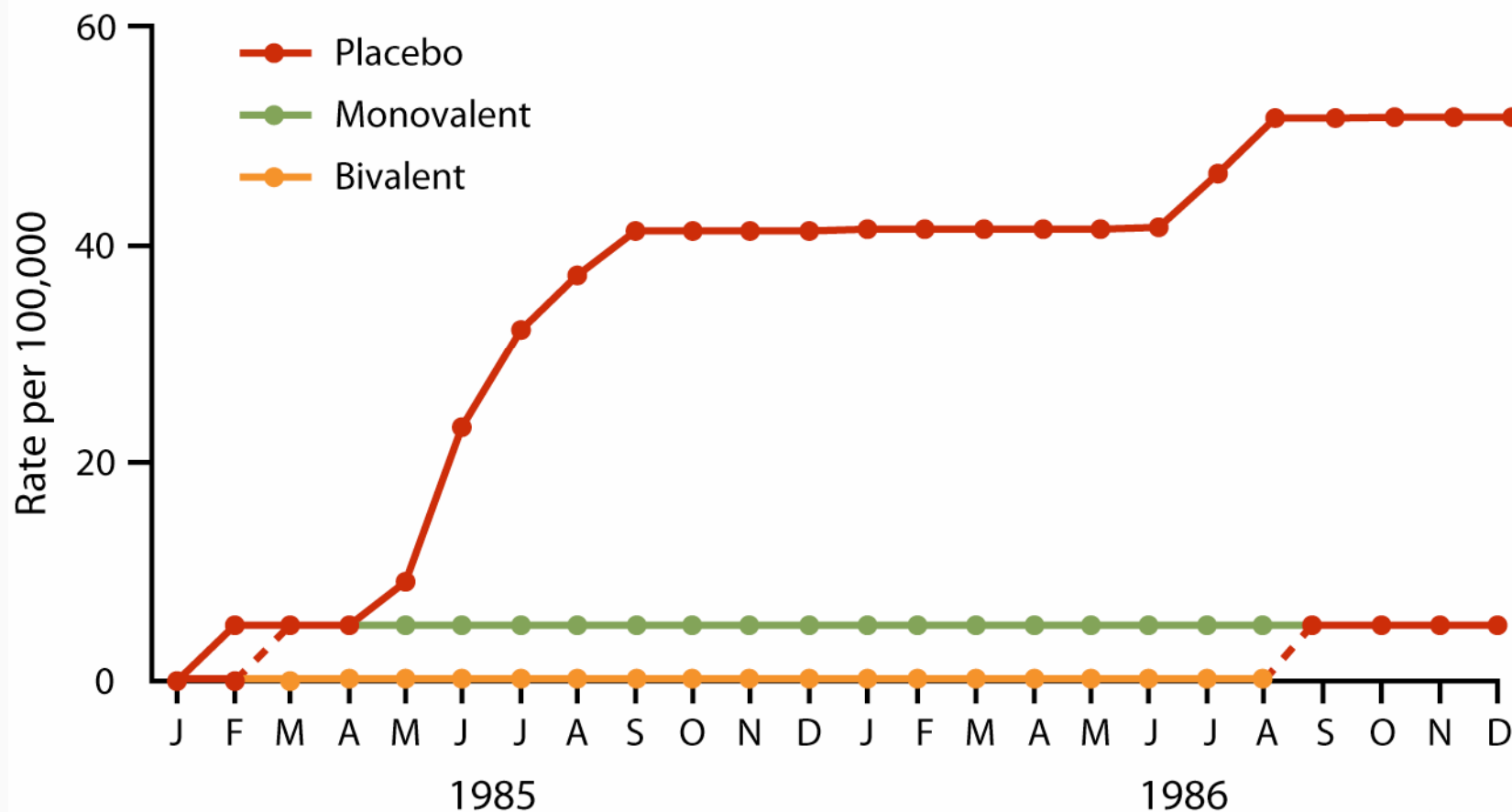


Rice Fields



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Cumulative Attack Rate for Encephalitis Due to Japanese Encephalitis Virus



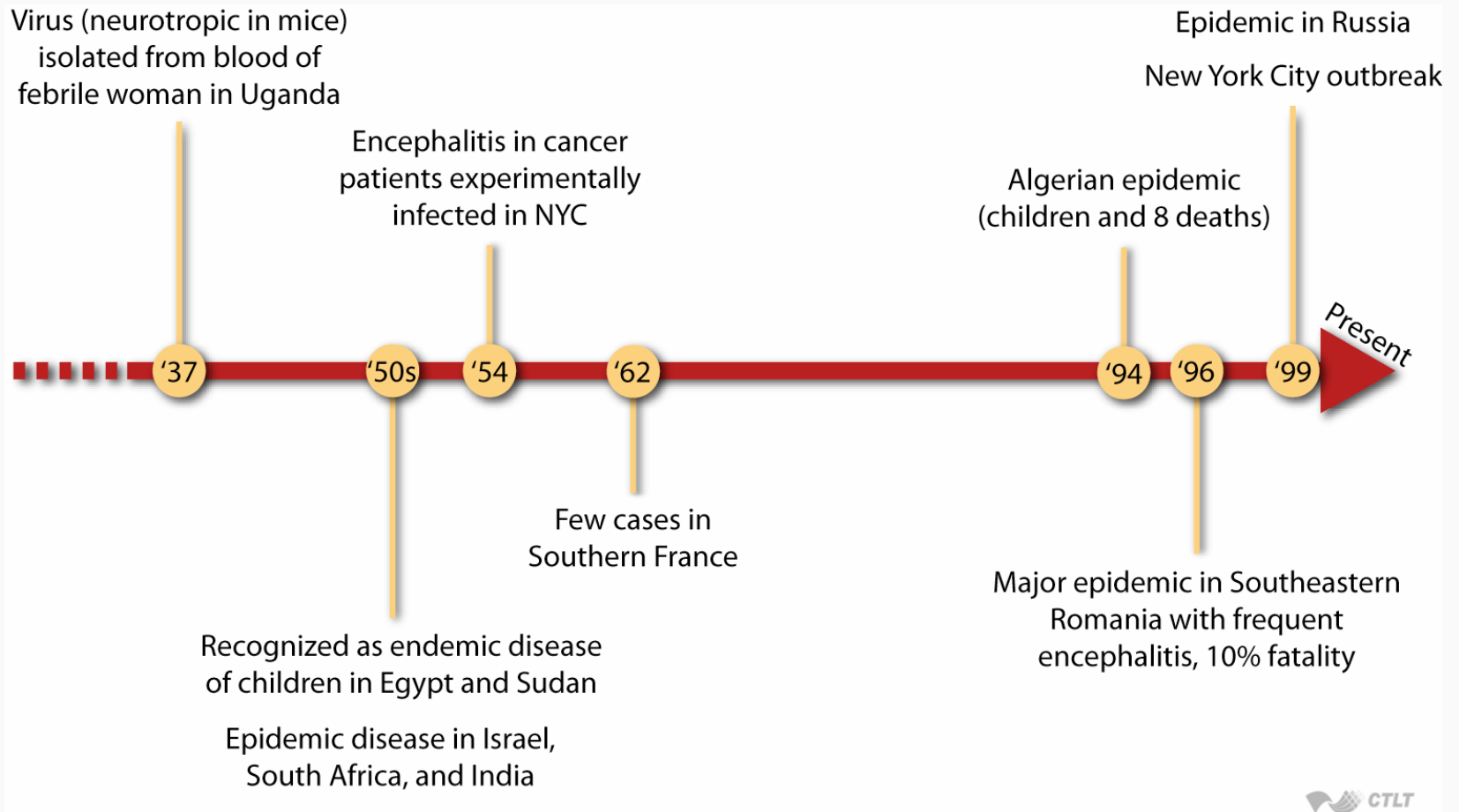


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Section C

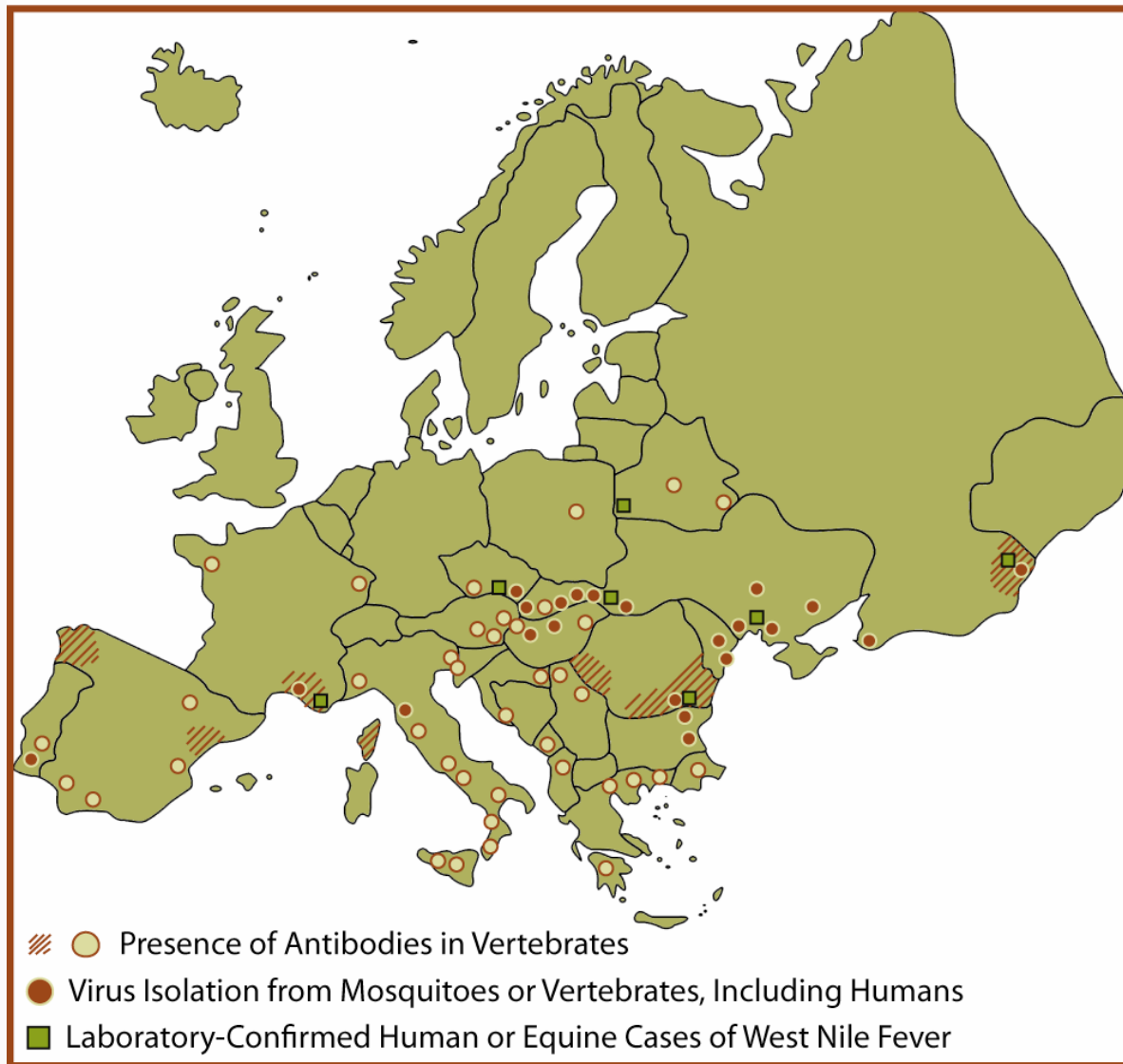
West Nile Virus

West Nile Virus: History



European Distribution of West Nile Virus

European Distribution of West Nile Virus



Adapted from CDC

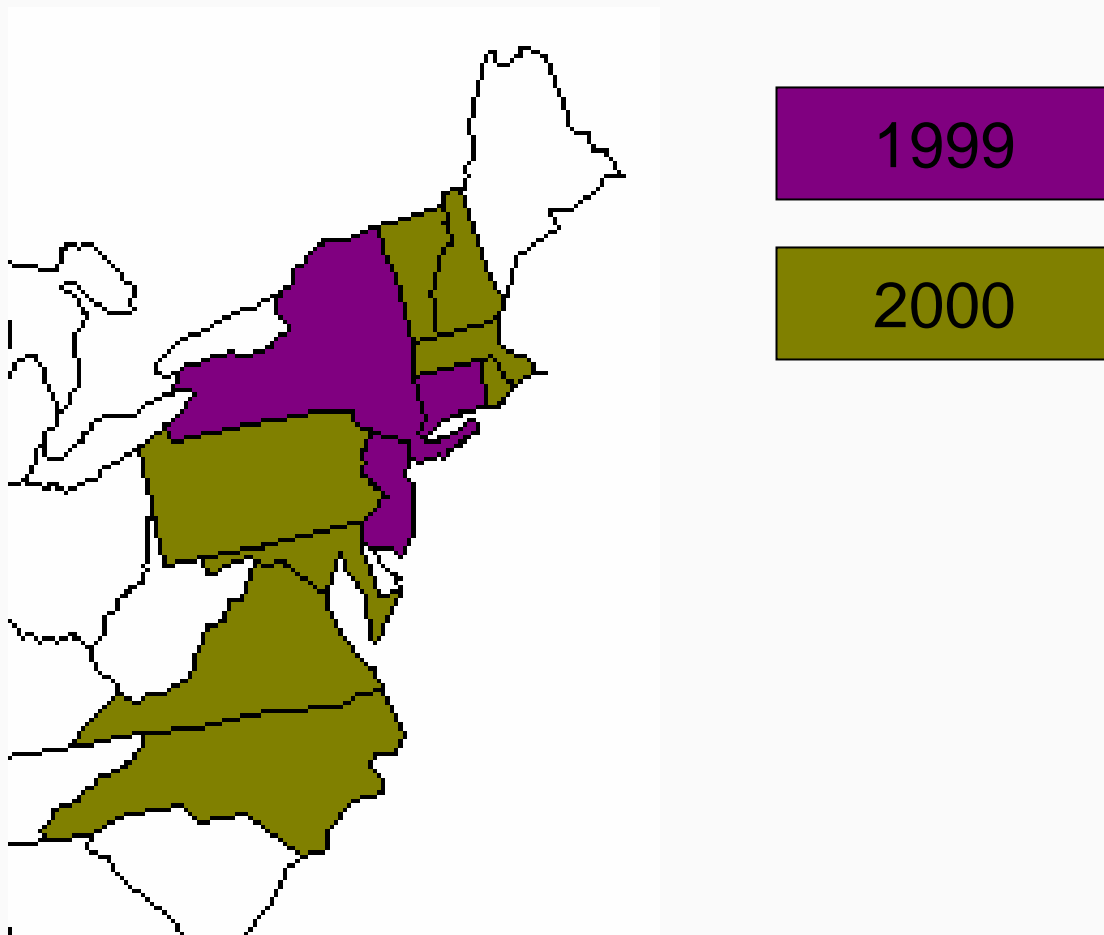
West Nile Virus: 1999 New York City Epidemic

- 8/23
 - ID physician called NYC DOH about two patients in Queens with suspected encephalitis
- 8/27
 - Same physician called about two more cases
- 8/29
 - DOH found eight cases in four-by-four-mile area of Queens—58–87 years old, no common exposure, no illness in household; all spent time outdoors
- 9/2
 - Tentative diagnosis of SLE; mosquito control begun
- Before and concurrent—increased NYC bird deaths, particularly crows
- Bronx Zoo—death of cormorant, flamingos, Asian pheasant; WNV isolated
- Virus closely related to Israeli isolate

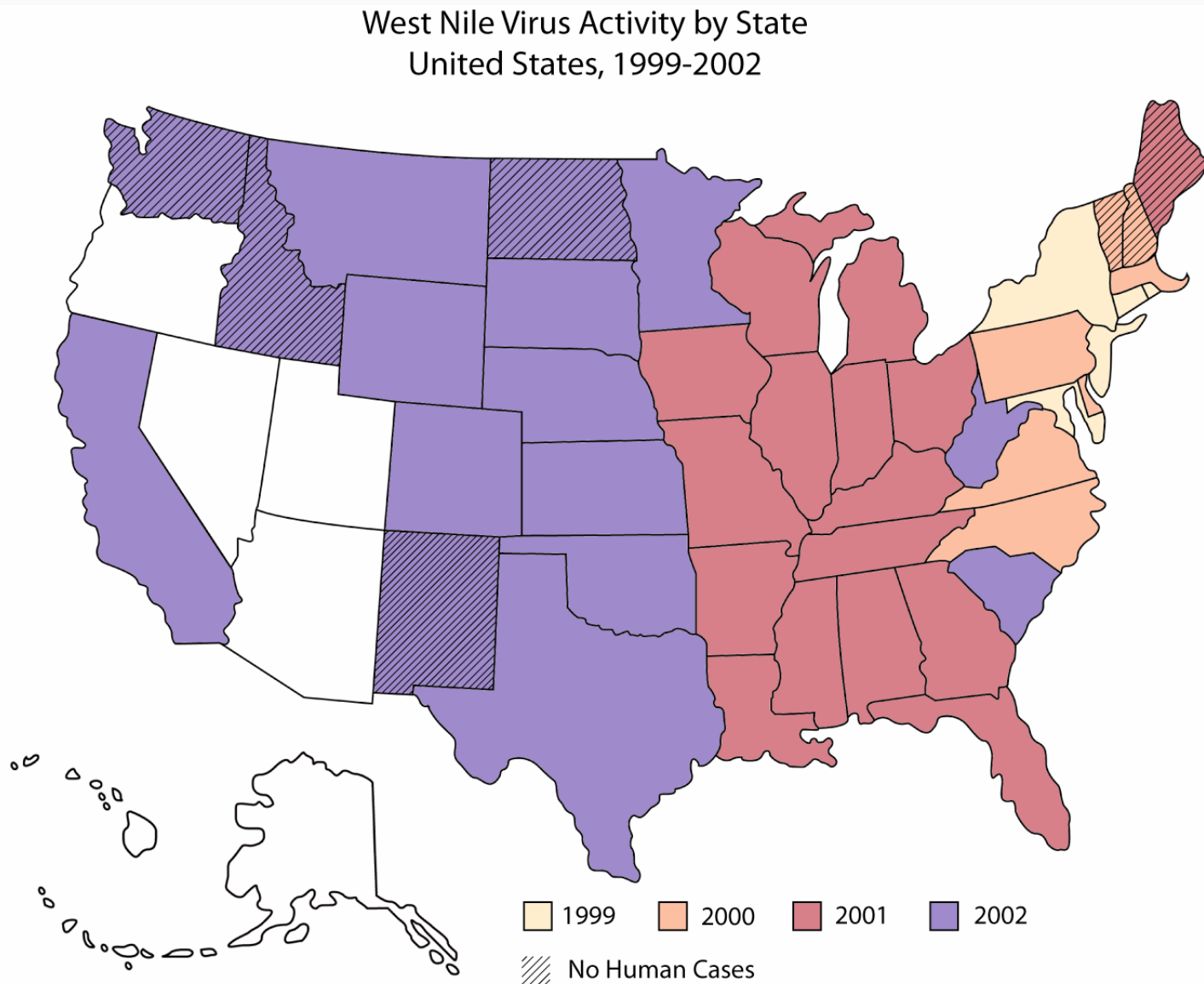
How Did West Nile Virus Cross The Atlantic?

- Man
 - Viremic patient (unlikely due to brief viremia and low titer)
 - Intentional (unlikely choice as a weapon)
- Bird
 - Migratory, windblown or hitchhiker
 - Contraband
- Mosquito
 - On airplane

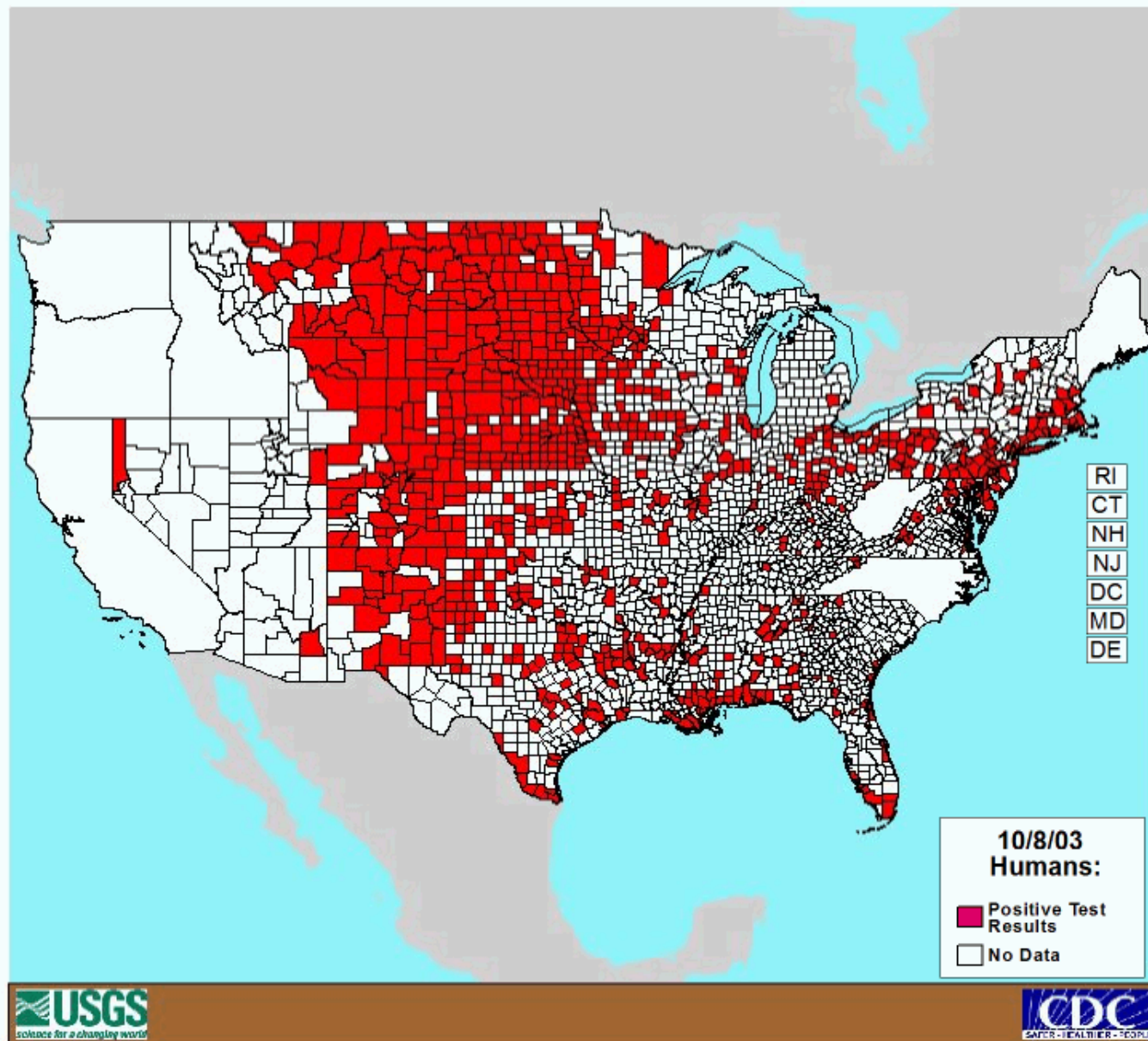
West Nile Virus: 1999 and 2000



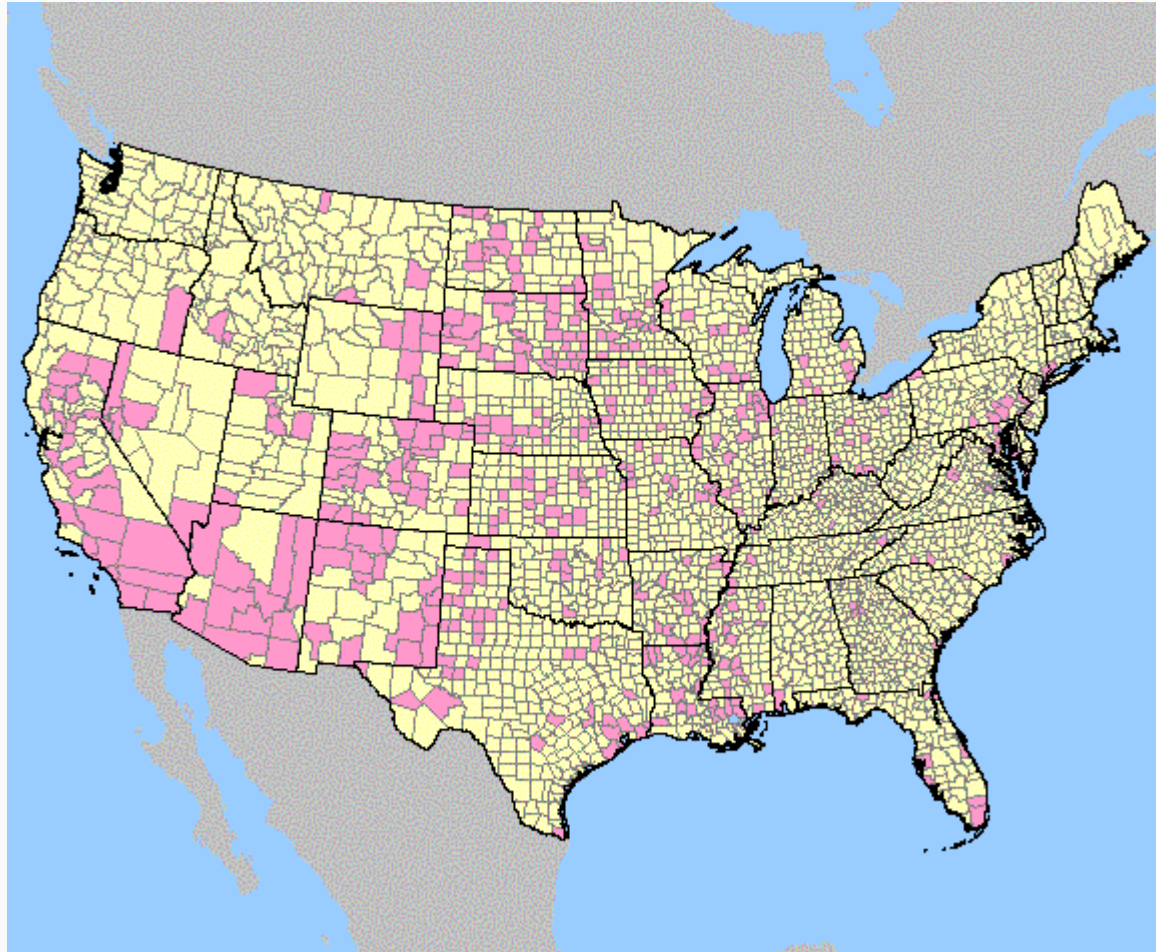
West Nile Virus Activity, by State



West Nile Virus 2003

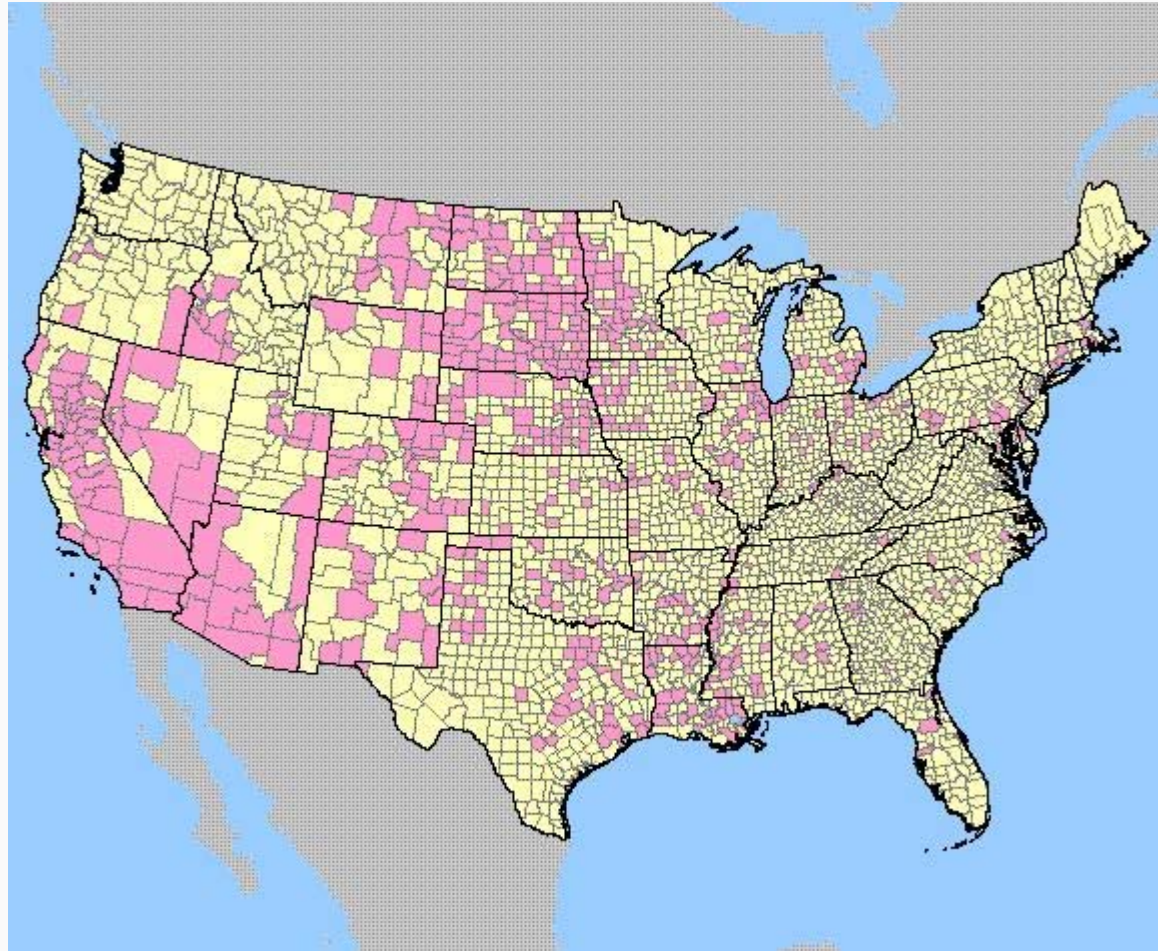


West Nile Virus 2004



Cumulative 2004 Data as of 3 a.m., Oct. 26, 2004. USGS/CDC.

West Nile Virus 2005



Human cases of West Nile 2005 (November). USGS/CDC.