

Researchers examine role of climate change in disease spread

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GALVESTON, Texas — Ever since scientists first proposed that our planet might be experiencing widespread climate change, concerns have been raised about its implications for the spread of arboviruses - viruses carried by arthropods such as mosquitoes, midges and ticks. However, while alterations in temperature and rainfall are important factors in making new territory hospitable to an invading arbovirus, many other forces also play significant parts in new patterns of viral emergence.

That's the message of a paper in the February "*Transactions of the Royal Society of Tropical Medicine and Hygiene*" by University of Texas Medical Branch at Galveston pathology professor Stephen Higgs and Oxford University professor Ernest A. Gould. In the article, Higgs and Gould examine the relative importance of climate change in the spread of four viruses that have captured headlines in the past 10 years: West Nile virus, Chikungunya virus, Rift Valley fever virus and Bluetongue virus.

"There's no doubt that during the past 50 years or so, patterns of emerging arbovirus diseases have changed significantly," Higgs said. "We picked prominent examples and asked how much is climate change a factor in these emergences?"

Since the viruses in question are carried either by mosquitoes (West Nile, Chikungunya, Rift Valley fever) or midges (Bluetongue), creatures whose activity and population increase in warm, moist environments, one would suspect that a transition to a warmer, wetter climate could

have opened the door for their spread to a new region. According to Higgs, though, it's not that simple. "You can't disassociate arbovirus diseases from the climate," Higgs said, "but many other factors affected the spread of these arboviruses."

Those factors include genetic mutation, the introduction of new species of mosquitoes, the presence of an immunologically vulnerable human population and ease of transportation of infected humans (Chikungunya virus); cyclic periods of high rainfall, modern irrigation projects, and livestock trade between Africa and southern Arabia (Rift Valley fever virus); and modern air transport, the availability of compatible mosquito species and large numbers of virus-spreading migratory birds (West Nile virus).

Of the four viruses under review, Higgs said, climate change could probably only be given the lion's share of the credit for the spread of Bluetongue virus. The midge-borne virus can cause fatal disease in sheep, goats and cattle and until about 10 years ago was limited to Africa. Then a warmer climate in Europe made it possible for the cold-sensitive *Culex imicola* midge species responsible for carrying the virus to move north. Today, borne by other midge species, Bluetongue has spread to 12 European countries.

"There are some confounding factors here, in that infected but asymptomatic livestock are being moved around, and midges can be spread great distances quickly by the wind," Higgs said. "But it seems clear that Bluetongue's dispersal has been driven by the northward expansion of *Culex imicola*, and that climate change may have contributed to that. If average temperatures increase in certain regions of the world as predicted by some experts, then species of arthropod vectors may disperse beyond their current geographic boundaries, and we need to be ready for the possibility that similar outbreaks could occur."

Source: University of Texas Medical Branch at Galveston

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