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Strains of the influenza virus A (H3N2) constantly evolve in East and Southeast Asia before spreading to the rest of the world
NASA/University of Cambridge

Flu Virus Always Comes from Asia

World's incubator of influenza viruses

Flu strikes Europe and North America each winter. But the virus is not native: it always comes from the agglomerated cities of East and Southeast Asia, where new strains of deadly influenza viruses evolve and expand around the globe, as revealed by two new studies published in the journal *Science*. "For over 60 years, the global migration of influenza viruses has been a mystery," said Colin Russell of the University of Cambridge in the UK, co-author of one of the researches. His team investigated 13,000 samples of influenza A (H3N2) virus, the most common type of influenza virus, coming from six continents in the period 2002 to 2007. The newly developed antigenic cartography delivered fine DNA differences between strains. The study focused on the gene encoding for hemagglutinin, a protein in protective shell of the virus involved in infection. New strains first emerged in East and Southeast Asia and then got to Europe and North America in 6-9 months. Several months later, the viruses reached South America, mostly because few South Americans travel to East and Southeast Asia. The study revealed that once they leave Asia, the viral strains rarely return there. "Regions outside of East and Southeast Asia are essentially evolutionary graveyards of influenza viruses," said Russell. At the moment, the authors can only take a guess on how East and Southeast Asia are good incubating sites for the virus because of the agglomerated and well-connected cities of the area. And, while in North America and Europe the flu peaks in winter, the disease is found all year long in the tropics. The other study, carried out by a team led by Edward Holmes, a biologist at the Pennsylvania State University, found similar results. However, this research did not compare a sole gene, but the whole genomes of influenza viruses coming from New York State and New Zealand. This study also pointed to a common tropical source for influenza viruses, but because of the low number of geographic samples, it could not locate a specific area. The importance of this study consists in the fact that it could explain why some influenza strains acquire resistance to not so common drugs, like Tamiflu. It appears that the genes of the influenza virus are connected in a complex way. "We show in our paper that you can't think of the evolution of [hemagglutinin] alone. The whole genome evolves," said Holmes. Influenza could turn resistant to new drugs by connecting together mutations of various genes. The studies could come with better forecasts of which strains should be investigated when developing new flu vaccines. Flu experts meet twice a year to assess strains they believe able to cause pandemics next season. Now that all of the above has been made known, they can channel their energies and resources on Asia.