How microbes travel around Earth: Models show bacteria sized microbes carried between Mexico and Australia

Science Daily

The researchers from Liverpool John Moores University (LJMU), Swiss Federal Institute for Forest, Snow and Landscape Research (WSL) and the Ecole Polytechnique Fédérale de Lausanne (EPFL) the University of Neuchâtel published their results in the *Journal of Biogeography* this month. They used large computer models of Earth's atmosphere to study how widely microbes could be dispersed.

LJMU's Dr Dave Wilkinson led the team along with Symeon Koumoutsaris, from the International Space Science Institute in Bern, who modified computer models which were designed for studying the dispersal of dust particles. They looked at what would happen if they released virtual microbes from both the southern tip of South America and also from Mexico. Once airborne, microbes of 0.02mm in diameter and below can easily travel thousands of kilometres.

Dr Dave Wilkinson, LJMU School of Natural Science and Psychology, explained: "Microbes less than 0.009 mm across went as far as Australia! These sizes would include microbes such as bacteria and many amoebae and also some fungal spores. We found that for smaller microbes, once airborne, dispersal is remarkably successful over a 1-year period. The most striking results are the extensive within-hemisphere distribution of small virtual microbes and the lack of dispersal between the Northern and Southern Hemispheres during the year-long time-scale of our simulations.

What our models show is that only the smallest microbes travel easily between continents. The larger ones (i.e. Larger than 20µm but still 500 times smaller than the 1mm threshold previously believed to separate the "cosmopolitan organisms" from those with potential biogeographies) cannot easily travel between continents on the time span of a single year. This is an important result as it very significantly increases the potential for microbial diversity."

Most microbes carried by wind are likely to be harmless, but outbreaks of certain disease such as meningitis in the Sahel region of Africa and foot and mouth disease have been linked to airborne microbes in the past.

"We stress that our model looks at only one aspect of microbial dispersal -- namely airborne transport to a new site. Once a microbe arrives, it clearly needs to reproduce, including potentially competing with microbes already at that location," Dr Wilkinson concluded. "Given the ease with which the smaller microbes disperse in our model it is possible that this (rather than dispersal itself) may be the rate-limiting step in many cases of microbial range expansion and this topic should form the topic for future research in this area."

SOURCE [1]

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