

Belgian scientists find link between climate change and the emergence of new pathogens

The results of their research will appear in the American trade journal PNAS.

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Dit is de omschrijving

While all eyes are on COVID-19, a virus that only reached humans some 18 months ago, microbes thousands of years old are lying dormant around the world. These are at least as harmful and at least as difficult to combat - and leishmaniasis is one of them. Researchers from the Institute of Tropical Medicine in Antwerp (ITM) have undertaken studies into the beast in the Peruvian Andes and found new indications that the emergence of new diseases and climate change go hand in hand. The results of their research will appear this week in the American trade journal PNAS.

Since the 1980s, scientists at ITM together with the Instituto de Medicina Tropical 'A. von Humboldt' (IMTAvH) in Lima have been studying the molecular epidemiology of leishmaniasis, an infectious disease caused by a parasite and spread via sandflies. The disease causes severe mutilations of the skin or intestines, and can lead to death. There is still a serious stigma concerning the disease, and it's not uncommon for people who become infected to be expelled from their communities and even their families.

Research into the South American variant was started by Professor Jean-Claude Dujardin who, together with Peruvian colleagues, collected samples of the parasite in the jungle to further investigate it in ITM and IMTAvH laboratories. A real breakthrough came earlier this year after Dr Frederik Van den Broeck brought the frozen samples back to life and managed to read the entire genome, thanks to modern technology. Under the leadership of ITM, an international group of scientists analysed 67 samples taken from the single-cell parasite. The results are ground-breaking and teach us a lot about the emergence and spread of new diseases.

"This study is a very rare and well-founded example of ecological speciation," says Dr Van den Broeck. "It shows us that climate change can give rise to new diseases. Parasites like these are interesting models for mapping the emergence of new species. This is because they have an intimate ecological connection with their animal host (e.g. a sloth) and vector (the sandfly). External factors such as climate change or deforestation can destabilise this ecological connection. This often results in a jump from pathogens to new hosts or vectors. In this case, we showed that a new species emerged from the old leishmaniasis species in the humid Amazonian forest in the tropical deciduous forests of the Andes. Using models, we were able to estimate that this may have happened during the last interglacial period some 120,000 years ago. At that time, the climate was similar to our current warm climate, which made it easier for the species to spread to other areas. Then came a long period of isolation during the Ice Age where the climate was significantly colder. If such periods of isolation last long enough, this can lead to a new species."

"Today we are completely under the spell of the corona epidemic," says Professor Dujardin. "A disease that is actually still very young, it does not occur in humans for more than two years. Leishmaniasis, on the other hand, is thousands of years old. We have seen drawings on Pre-Colombian ceramics of people mutilated by the disease. The most pathogenic species is found in the Amazon rainforest. It is one of the diseases which caused the indigenous peoples to flee the jungle to live in the Andes. In the meantime, leishmaniasis has existed in Europe for several centuries, particularly in the areas around the Mediterranean. In recent years, due to global warming, it has come very close. In some areas such as France and Spain, it is even endemic, which means that it has started to lead a life of its own."

Dr Van den Broeck adds that migration and the way people live and move also play an important role in the spread of leishmaniasis. "Since the 1980s, the most pathogenic form of leishmaniasis has been able to spread more and more among people because, for certain reasons, they have penetrated deeper

and deeper into the jungle. Think of guerrillas or drug traffickers. This is how the new species came back into contact with the old species, which gave rise to a new local epidemic of leishmaniasis. Because we had such a unique collection of parasites, we can make these connections very clearly.”

“The study is therefore a unique example of man’s influence on the spread of diseases: global warming on the one hand, and globalisation and migration on the other. As the climate continues to change we will see more and more tropical diseases emerging in our regions. And they are coming to stay,” concludes Dr Van den Broeck.