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Extra Credit – Eric Arts

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Eric Arts studies the spread of HIV at the Case Western Reserve University School of Medicine. He does research in Uganda and other sub-Saharan countries to help improve conditions for those living with HIV/AIDS. The purpose of his lecture was to explain where the HIV virus originated and how the different strains spread in humans. In his lecture he attempted to explain how HIV-1 spread from primates to humans.

Firstly, Arts talks about what a virus and retrovirus is. HIV is the human immunodeficiency virus. HIV is a retrovirus because it copies RNA to DNA and integrates itself into the chromosomes of the cell it infect. The retrovirus can stay there dormant as the cells duplicate, so they are impossible to get rid of completely. To explain how HIV originated he used phylogenetic trees. The problem with tracing HIV is that there are so many different strains and types of HIV and many of them came from different sources.

There are beliefs that HIV was transmitted to humans through some form of sexual contact, but this idea is absurd. Contrastingly, HIV was probably transferred through the trade and consumption of bush meat, or butchered primates. In the jungle, the only source of meat is generally non-human primates or monkeys. Arts also says that based on the patterns of how the virus spread, researchers concluded that it most likely originated in Africa, not Asia or South America. That being said, of the 33.4 million cases of HIV, 22.4 million are in sub-Saharan Africa. Using the phylogenetic trees to compare the SIV virus in primates to HIV in humans, the virus Sooty mangabey is the closest to HIV-2. However, HIV-1 is more difficult to place. It most likely is related to chimpanzees but there was divergence within the chimps as well. Art talks about the study that was done to determine what region the HIV virus most likely spread to the human population.

In the study, researchers sampled the feces of all the chimps in different areas to map out what chimps lived where. They to the DNA and found the ones that were infected with the SIV that was closest to HIV-1 were mostly in southern Cameroon. They also studied gorillas and found a strain that may have evolved into a rare strain of HIV.

The next question Arts posed was: when did the HIV virus get into the human population? To trace back the jump from primates to humans, researchers measured the amount of mutations in each generation. It originated somewhere in the Congo basin and it remained there for fifty to sixty years. So how did it become an epidemic? Because of the dormant nature of HIV it does not easily spread. Also, the Congo basin was very impenetrable. The virus was probably taken around the world many times but whoever carried probably only spread it to his immediate family, who then died, ending the chain. However, in the late seventies the virus came out of “hiding” and globalization spread the disease. It got to the United probably through Haiti. Meanwhile, it spread elsewhere in the world. For this reason, there are many different strains of HIV.

This lecture was relevant to human evolution because it depicted the evolution of the HIV virus and how the virus interacted in different primate and human species. Viruses do serve as a mechanism by which natural selection and therefore evolution works. Arts said that a lot of our DNA is composed of remnants of viruses that our ancestors had. Although the HIV virus is not changing or mutating as much as it did in the 1980s, HIV is still an epidemic that still needs to be researched. Until a cure is found, HIV will continue to kill 2,000,000 people a year