

Virus Adaptation by Manipulation of Host's Gene Expression

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Viruses adapt to their hosts by evading defense mechanisms and taking over cellular metabolism for their own benefit. Alterations in cell metabolism as well as side-effects of antiviral responses contribute to symptoms development and virulence. Sometimes, a virus may spill over from its usual host species into a novel one. In most cases, this virus will fail to successfully infect and transmit into the new host. However, in some cases, it transmits and persists after fixing beneficial mutations that allow for a better exploitation of the new host. This situation would represent a case for a new emerging virus. Here we report results from an evolution experiment in which a plant virus was allowed to infect and evolve on a naive host. After 17 serial passages, the viral genome has accumulated only a few changes, but these have a tremendous effect on viral fitness and pathogenesis. DNA microarray analyses show that the evolved and ancestral viruses affect the global patterns of host gene expression in radically different ways. A major difference is that genes involved in stress and pathogen response are not activated upon infection with the evolved virus, suggesting that selection has favored viral strategies to escape from host defenses.