

# Bread mold may hold secret to eliminating disease-causing genes

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When most people discover mold on their bread, they immediately throw it out. Others see a world of possibilities in the tiny fungus. A University of Missouri scientist, along with a collaborative research team, has examined a new mechanism in the reproductive cycle of a certain species of mold. This mechanism protects the organism from genetic abnormalities by “silencing” unmatched genes during meiosis (sexual reproduction). The finding could have implications for higher organisms and may lead to precise “targeting” of unwanted genes, such as those from the HIV virus.

“Meiotic silencing also occurs in worms, mice and human beings,” said Patrick Shiu, assistant professor of biological sciences in the MU College of Arts and Science. “It’s unlikely that all share the same mechanism, but the principle of targeting unpaired DNA for silencing seems to be found in both simple and complex organisms. Knowing the process of how DNA in molds is targeted for silencing could be important for silencing genes you don’t want to be expressed, like disease-causing genes.”

Shiu and his colleagues discovered that each sexual cell in mold has an internal mechanism that “scans” paired chromosomes for anomalies. The researchers found that when one chromosome in a pair carries an extra copy of a gene not found in its partner chromosome, it is a good indication of an intruder and the fungus will “turn off” all copies of that gene during meiosis. The researchers call this process “meiotic silencing by unpaired DNA,” or MSUD.

"MSUD defends the fungus against invasion at a time when chromosomes are especially vulnerable to the spread of viruses and insertion sequences," Shiu said.

Shiu's research enhances understanding of how to "shut off" undesirable genes, sheds light on the genetic components of the MSUD pathway, and may have applications in a number of industries, including pharmaceuticals and agriculture.

Because of his contribution to the field of genetics, Shiu recently received the Beadle and Tatum Award, named after Nobel Prize-winning geneticists George Beadle and Edward Tatum. The award was established to recognize outstanding and original research by a scientist using *Neurospora*, a type of bread mold, as a model organism.

Shiu's latest study, funded by the National Science Foundation, was published as the cover feature in the journal *Fungal Genetics and Biology*.

Source: University of Missouri-Columbia

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