The fungi that ate my house

Ten years ago, I was a professor of cell and molecular biology at Tulane University in New Orleans, Louisiana. I was riding high on a series of recent academic honors for my work studying toxicogenic molds and was looking forward to spending a sabbatical leave at The Institute for Genomic Research, now the J. Craig Venter Institute, in Maryland. Then, in August 2005, just a few weeks before I was to leave on sabbatical, Hurricane Katrina nearly destroyed my university and my city. The storm upended my comfortable life and unexpectedly sent me down a new research trajectory.

The weeks after Hurricane Katrina were some of the worst of my life. My family and I had safely evacuated to New Jersey, where we had friends who could house us, but our home had been flooded and our city devastated. I suffered acute insomnia, heightened by the fact that I knew too much about mold metabolism. Fungi, the life forms that had fascinated me since childhood, secrete digestive enzymes into the environment, often turning their substrates to slime, and then reabsorb the breakdown products. They are nature’s great recyclers. I hated knowing that molds were recycling the contents of my waterlogged home.

More than a month after Hurricane Katrina, we flew back to New Orleans to survey the damage. When we unlocked our front door, we were greeted with fungal anarchy. Molds were growing on everything: rugs, curtains, wallpaper, upholstered furniture, and—worst of all—some of my most treasured books. The odor was overpowering.

Before my return to New Orleans, I figured I might salvage something from the loss of my home if I turned it into a living laboratory. I visited Jim White, a mycologist friend at Rutgers University in New Jersey, who equipped me to sample the molds in my flooded home. I traveled with a suitcase full of sterile swabs, masks, gloves, and 10 sleeves of petri dishes filled with growth media. As I sampled my house, wearing gloves and a mask, I started to feel sick. I had to take several breaks and go outside. I began to empathize with people who claimed to have gotten sick from indoor mold exposure, a controversial condition sometimes called “sick building syndrome.” I vowed that if I ever got a functioning lab again, I would study the volatile compounds that were causing the odious smell in my house.

Later that fall, Rutgers invited me to finish my sabbatical plans, and all of the microbial cultures in my Tulane laboratory had died during the weeks without power after the storm, so it was an attractive offer. Several months later, I agreed to stay on at Rutgers as founder and associate vice president of the Office for the Promotion of Women in Science, Engineering, and Mathematics.

During my first years at Rutgers, I worked on issues related to women in science while reinventing my research career. In my new laboratory, as I had promised myself after Hurricane Katrina, my team adapted genetic models to study the possible physiological effects of fungal volatile organic compounds (VOCs). We found that several common fungal VOCs are neurotoxic in a Drosophila (fruit fly) model. Somewhat surprisingly, we also found that the VOCs from the most common fungus isolated from my flooded home, a Trichoderma species, can make the plant Arabidopsis and tomatoes grow better. Although I haven’t been able to demonstrate that the gases from molds contribute to sick building syndrome, I have been able to show that they have many profound physiological effects.

I don’t recommend experiencing a devastating hurricane and losing your home as a way to revitalize your research. Nevertheless, my science has kept me focused on future possibilities rather than on past losses. The Hurricane Katrina catastrophe has led me to what may be the best science that I have ever done.

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