Fighting 'forever chemicals' with microbes

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Per- and polyfluoroalkyl substances (PFAS) are some of the most persistent environmental pollutants, earning them the moniker "forever chemicals." Increasing concern about the adverse health effects of PFAS exposure has researchers seeking novel ways to break down the stubborn pollutants. A cover story in *Chemical & Engineering News*, the weekly newsmagazine of the American Chemical Society, that was produced in collaboration with ACS Central Science explains how microbes could

help solve the PFAS problem.

PFAS are found in an array of items, including personal care products, stain- and water-repellent coatings and food packaging. Their persistence lies in their strong carbon-fluorine bonds, writes special correspondent XiaoZhi Lim. PFAS have become notorious for polluting the water and soil surrounding manufacturing facilities and military sites, and although the full health effects of the compounds are unknown, some are thought to be toxic or carcinogenic. After observing microbes consume contaminants from other environmental disasters, such as the *Deepwater Horizon* oil spill, scientists hypothesized that microbes could do the same for PFAS under the right conditions. However, some experts believe the presence of fluorine atoms renders these chemicals "almost bulletproof."

Despite the challenges, scientists are pushing forward to identify a microbial method to break down PFAS. The key is for the microbe to find weak spots in the compounds' structure, which the bacterium *Gordonia* and at least one commercially available microbial culture have done. Moreover, a strain of the microbe *Acidimicrobium* appears to degrade perfluorooctanoic acid and perfluorooctane sulfonic acid (which have no weak spots) by defluorinating them. Even though these initial results seem promising, there are still significant challenges when it comes to degrading PFAS outside of the lab. A feasible suggestion is to isolate the contaminants in a treatment facility, where chemical and biological remediation can be combined. However, even if microbes can help clean up PFAS, most scientists agree that reducing or eliminating the use of the forever chemicals will be the most effective way to address pollution.

More information: "Can Microbes Save Us from PFAS?," cen.acs.org/environment/persis … -save-us-PFAS/99/i10

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