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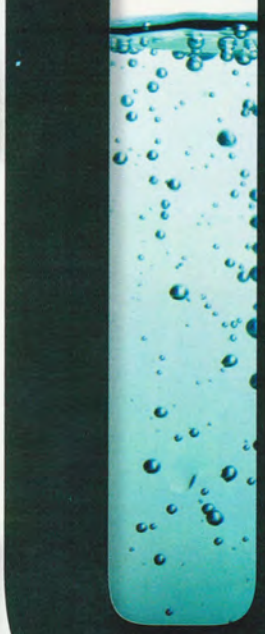

SCIENCE DELIVERS SOLUTIONS TO LIFE'S MOST VEXING PROBLEMS

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AILMENT

MOSQUITOES

CURE

Chemical Invisibility Cloak

Since the 1940s the leading defense against mosquitoes has been the chemical repellent DEET, but unless you remember to spritz yourself with it every few hours, you will eventually get chomped. Entomologist Anandasankar Ray and colleagues at the University of California, Riverside, aim to do better with bug sprays intended for bugs, not people. They are developing a set of chemicals that disrupt the mosquito's sense of smell, effectively blinding the insects to humans.

ILLUSTRATION BY JONATHON ROSEN

Mosquitoes are basically flying hypodermic needles, infecting 700 million people annually; malaria alone kills about 800,000 a year.

Ray started with 50 compounds thought to disrupt the ability of mosquito olfactory sensors to detect carbon dioxide, the telltale sign of a living, breathing blood meal. He then turned the tables and jabbed the mosquitoes, inserting tiny electrodes into their sensors. One chemical, 2-butanone, acted as a carbon dioxide imitator, which could be exploited to lure the bloodsuckers. Another, butanal, prevented the CO_2 sensors from working, while 2,3-butanedione functioned as a blinder, flooding mosquitoes' sensors with signals, thereby rendering them useless.

Ray has since teamed up with a group of investors to found OlFactor Labs, based in Southern California, to develop commercial mosquito deterrents. He envisions odor traps that could be set up around golf courses or hotels to mimic carbon dioxide and draw mosquitoes away from populated areas. He is also exploring the possibility of an area-masking agent. Instead of DEET sprayed on the skin, an odor cloud of the binding chemicals could keep mosquitoes at bay with an "invisibility cloak" that makes CO_2 undetectable. Such cloaks could be especially valuable around homes in the world's malaria zones. So when can we ditch the DEET? Ray says cloaking sprays and odor traps could be here in five years. JASON DALEY

THE CURE

AILMENT

RADIOACTIVE FALLOUT

CURE

Blue Goop

Carting away large chunks of radioactive waste from a disaster area like Japan's Fukushima Daiichi nuclear plant is bad enough. But disposing of radioactive fallout that clings to walls, seeps into crevices, and coats rescue vehicles is an altogether more vexing problem.

You can wash off the contamination with soap and water–the traditional method–but that creates sizable reservoirs of radioactive runoff, which in turn has to be trapped, treated, and stored away for centuries.

CBI Polymers, a Hawaii-based manufacturer of decontamination products, has developed another option called DeconGel, which can be sprayed, troweled, or painted onto any surface. The blue liquid (which is 95 percent water and 5 percent proprietary chemicals) oozes into microscopic pores and bonds with loose material. When it hardens, it shrinks by about 20 percent, sucking up fine radioactive particles and encapsulating them in its folds.

"Our gel helps regain control of the radioactive material and produces 90 percent less waste than water," claims Shaun McCabe, president of Asia-Pacific systems for CBI Polymers, which recently donated 100 five-gallon pails of its cleaner to the Fukushima cleanup effort and hopes to sell hundreds more there. "You can either compact that waste and dispose of it in a landfill, incinerate it and reduce its volume to ash residue, or dissolve the gel in water and then treat the water."

Scientists working for CBI's parent company, Skai Ventures, originally had their eye on an entirely different product when they discovered the sticky gel. While researching corneal implants, a careless lab tech accidentally dribbled an experimental compound on the floor. After it dried, workers peeled it off and discovered the floor was cleaner than they had ever seen it before. Amazed at the compound's cleaning abilities, they pursued the science.

CBI has since enhanced the compound with chelants, additives that bind to lead dust, radioisotopes, and other hazardous materials. The company now markets the product for everything from crime-scene cleanup to decontamination of meth labs and Department of Defense sites. ADAM PIORE