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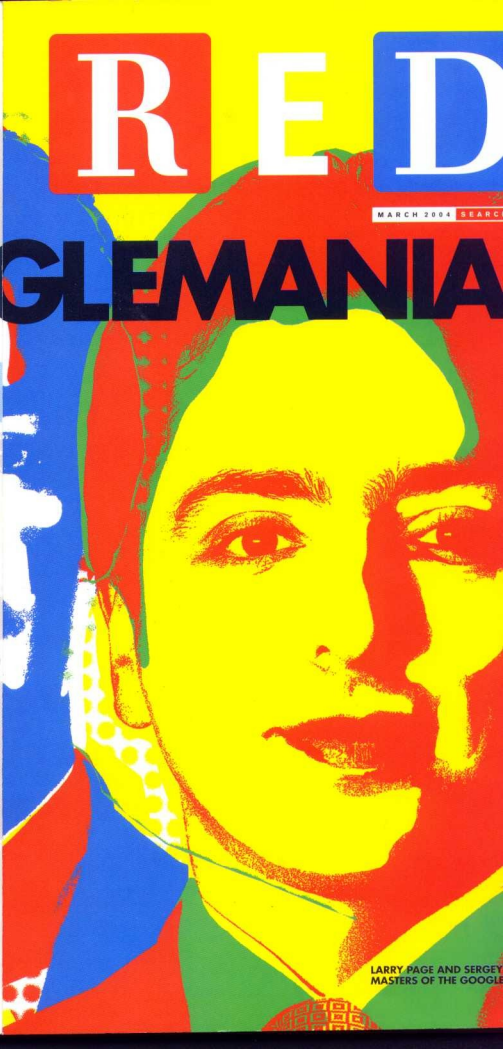
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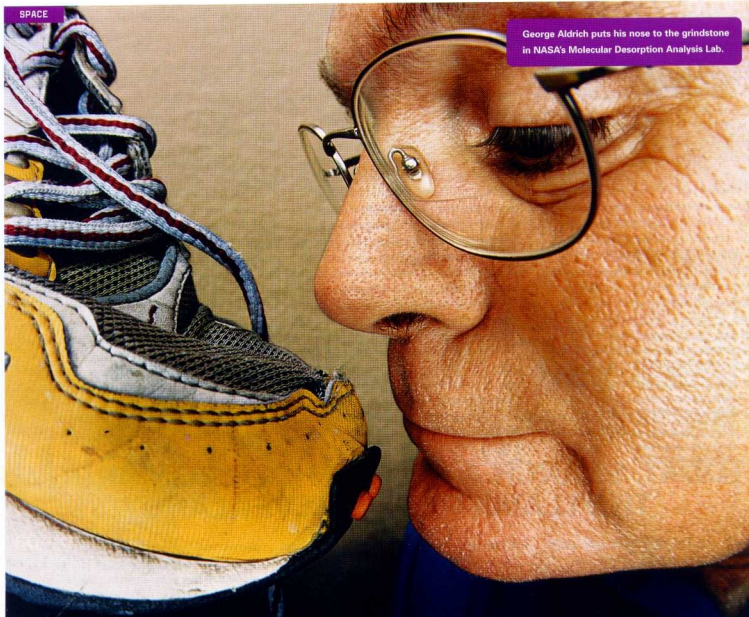
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One Small Sniff

How a finely tuned pair of nostrils keeps the US space corps from stinking to high heaven. **by Angela Swofford**

Ten small glass bottles of colorless liquid rest on an otherwise empty table. Seated before them, poised like an athlete ready to carbo-load before a big game, is George Aldrich, a bearish man with a baby face, silver hair, and blue eyes, wearing a baseball cap emblazoned with the "meatball" logo of the National Aeronautics and Space

Administration. Aldrich, NASA's master sniffer, smells every object that US astronauts take into space.

Three of the bottles contain water; seven are pure essences from "floral" to "putrid." Slowly, he reaches for the bottle farthest to his right, unscrews the cap, and inhales with the deliberateness of a connoisseur.

"Mmmm," he says. "Minty." He takes the second bottle, noses it – and grimaces. Putrid. "Pheew! These are fresh!"

This routine calibration test is all for a good cause. Even a little bit of air pollution can turn into a major problem in the cramped quarters of a space vehicle – silent but deadly. At the White Sands Test Facility in

ew Mexico, NASA odor-testing panels out "smelling missions" to determine whether something on board a spacecraft will convey that not-so-fresh feeling. Their method: Stick some guy's nose in it.

Aldrich – a chemical specialist in the Molecular Desorption Analysis Laboratory at White Sands – is that guy. It's not what he thought he'd be doing 30 years ago. He was an 18-year-old firefighter at the missile test range a few miles away, and one day his chief came looking for volunteers to smell stuff. Aldrich wanted to do something to help astronauts, to be a part of NASA. He took his first calibration test and scored a perfect 10 out of 10. He's now taken the test 100 times, and he always gets 10 out of 10.

Today, he's NASA's nasal nut, the man colleagues call the Most Smella Fella. He has performed a record 771 official smelling missions. "It's like being a court wine taster for medieval kings, you know?" he says. "The guy who used to make sure the stuff was good to drink. We kind of do the same with the astronauts. It's our way of protecting them." In one corner of his business card is a space shuttle next to a skunk. Printed across the

engineer's problem; Aldrich and a rotating team of a half-dozen others try to stave off more boneheaded stuff. According to NASA procedure, an odor-testing panel must clear for launch everything from lab gear to astronauts' personal effects. Aldrich has smelled stuffed animals, cameras, film, grease, oil, tampons, toothpaste, aftershave, an IBM laptop, cosmonaut Alexander Lazutkin's photo album, and Disposable Absorption Containment Trunks (adult diapers for space walks).

While Aldrich is finishing the 10-bottle test, technicians in the toxicity lab are removing today's sample from an industrial oven. It has spent three days there, slow-roasting in clean, dry, 120-degree air that mimicked the heat inside a space capsule.

Before the odor panel smells anything, the samples are run past a gas chromatograph and a mass spectrometer. That determines toxicity, but not even the most sophisticated equipment can ascertain how they actually smell. Technology, says Alan Gelperin, a computational neuroscientist at the Monell Chemical Senses Center, "has no knowledge of what is

panels donned reusable masks. The masks took hours to clean between missions, but they had no smell. Disposables are more convenient, but they have a slight oily scent. Aldrich inhales quietly to induce "olfactory fatigue" – soon he doesn't notice the oil.

Then, with a thick needleless syringe, a chemist pulls 30 cubic centimeters of air from the desiccator holding the sample. She walks over to Aldrich, plugs the syringe into his mask, and slowly depresses the plunger.

His eyes widen. He coughs once explosively and shuts his eyes hard. "That was definitely biting," he says when he gets his breath back. "Very pungent." He clears his throat. "I'm passing it. But it is borderline." The other four judges get their puffs, with similar reactions. One judge gets nauseated. The stuff in the desiccator barely scrapes through.

The taste stays with Aldrich for the rest of the morning. "In my mind, I'm not really expecting them to be that bad," he says later. "I guess what you worry about more than anything else is the stinky or pungent one, where it bites or burns up your nose. That's not pleasant."

IF SOMETHING SMELLS IN THE SPACE PROGRAM, I'LL BE THERE TO GET WIND OF IT'

Bottom is: IF SOMETHING SMELLS IN THE SPACE PROGRAM, I'LL BE THERE TO GET WIND OF IT.

Spacecraft are notoriously stinky. In orbit, they experience a full day/night cycle every 90 minutes. For half that time the sun heats the cabin, causing objects to off-gas, releasing volatile chemicals offensive to mammalian noses. Fabrics, paint, even electronics have odors, all but undetectable on the ground. In space, you can't just roll down a window or light a match.

A particularly bad stench can end a mission. In 1976, halfway through Soyuz-21 the first manned voyage to the Salyut-5 space platform – cosmonauts Vitaly Zholobov and Boris Volynov smelled something acrid coming from the Salyut's environmental control system. The two couldn't find the source of the problem; the odor became unbearable. They aborted the mission and returned home a month early. Suspected cause: fuel leaking into the air supply.

That kind of mechanical failure is an

offensive. A human assigns meanings."

People can distinguish thousands of different odors, some at concentrations of one part per billion. In the upper reaches of the nostrils are two postage stamp-sized patches of nerve cells, every one studded with receptor proteins that recognize certain molecules. Although any number of animals have exquisitely sensitive noses, only a human brain can guess how another human will gauge hedonic quality (pleasant versus repulsive). Toxic does not necessarily mean noxious, or vice versa.

It's time for today's smelling mission, and I'm hoping for something juicy – surplus freeze-dried ice cream, Buzz Aldrin's socks. Aldrich and the rest of the panel file into an office in the toxicity lab and put clear, disposable plastic masks over their noses and mouths. And then, talk about a letdown: Today's sample turns out to be four metal strips coated with blue ink.

Aldrich pauses. A decade ago, odor

Members of the odor panel usually don't know what the samples are. But this time, it's right there on the manifest: Allskin Surgical Marker, used to label spacesuits. I call ILC Dover, the manufacturer, to tell them the product offends. A materials engineer hastens to tell me that they label suits months before a shuttle heads into space. The bloom will be well off the ink by then.

But Aldrich is skeptical. "Inks have a long, harsh history with us," he says. "After the accident with Apollo 13, the flight plans for Apollo 14 through 17 were rewritten. But they were printed with a different ink. Those manuals stank so badly that all the judges got blisters in their noses. They had to reprint the thing with a different ink. It almost delayed Apollo 14."

He's practically snarling. Forget the jokey business cards. It turns out huffing Sharpies is a mission-critical application. ■ ■ ■

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