

Reference only

TECHNOLOGY

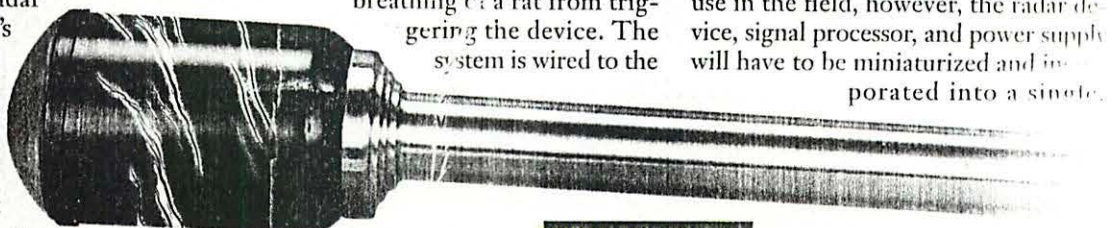
The Radar Flashlight

GENE GRENEKER HAS come up with a way to spot a person lurking behind a wall or closed door. The key to this nifty trick is a device the Georgia Tech researcher calls a radar flashlight. Greneker's invention detects the slight rise and fall of a person's breathing chest and is sensitive enough to spot someone standing as much as six feet behind a concrete wall.

A transmitter at the head of the flashlight sends out a low-energy microwave signal that can penetrate doors or walls (unless they are made of metal, which reflects most of the signal). When the beam strikes something on the other side of the wall, it bounces back toward the receiver, also located in the head of the flashlight. If the target object moves, the return frequency shifts slightly from the original signal—shortened if the target

moves toward the detector, lengthened if away.

In laboratory tests, Greneker determined the types of frequency shifts that would be caused by a human torso during respiration. Then he built a signal-processing system that could extract just those frequencies—preventing, say, the breathing of a rat from triggering the device. The system is wired to the



THIS FLASHLIGHT CAN SEE THROUGH WALLS AND RUBBLE.

flashlight, as is the computer screen that displays the signal. "You see them as they breathe. It's like an ECG machine, where you have a flat line, then a little hump, then another hump," he says.

Greneker's device could prove to be a lifesaving invention. Rescue workers could use it to search for people trapped in the rubble of collapsed buildings, and it would be a boon to police officers

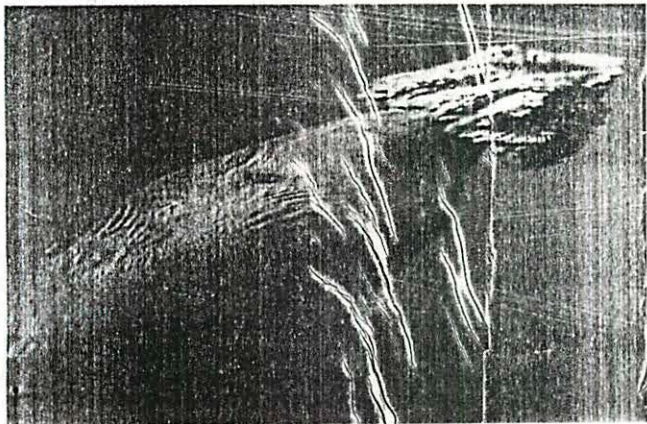
searching for hidden suspects. "If I had to go into an unknown home at night and do a search of the closets," Greneker says, "I sure would like to have something to look through that door before I opened it to find somebody armed on the other side ready to shoot me."

Before the radar flashlight is ready for use in the field, however, the radar device, signal processor, and power supply will have to be miniaturized and incorporated into a single

flashlight-size unit. A concealed person's respiration signature could be represented as a flashing light, or a tone, rather than a blip on a bulky monitor. "In the case of law enforcement, you may not want it to make a noise," Greneker says. "You might put in a little buzzer that vibrates, or a bar that goes up and down, like the one on your stereo system that tells you the volume. It might be as simple as something like that."

Call Me Spongeface

When a team of American and Swedish biologists observed a dolphin with a cone-shaped sponge over its beak in Shark Bay, off Western Australia, a few years ago,



they thought they were witnessing the quirky behavior of a lone dolphin. Since then, however, the biologists have found several Shark Bay dolphins carrying sponges. "Some of the sponges are really great big things that flop around and cover part of a dolphin's face," says Rachel Smolker, a behavioral ecologist at the University of Vermont. So why would the dolphins burden themselves with something that increases their drag and might also interfere with their echolocation abilities, which they use for orientation and hunting? Smolker isn't sure but suspects that the

dolphins use the sponges as a foraging tool. The sponge may protect them from the spines of stingrays, lionfish, or prickle prey. Or it may protect their beaks from abrasion while picking in the sandy bottom to flush out burrowed animals. Most of the dolphins in Shark Bay, however, don't use sponges. "It could be that only a few do it because it takes a lot of skill," says Smolker. Or, she says, it may be that "there is some kind of dominance and some dolphins are forbidden a less lucrative foraging method and have to use special techniques to hunt successfully."

ANIMALS

Platypus Dreams

BIRDS DO IT, BEES—well, no one knows for sure, but they probably don't. Humans do it, for about an hour every night. It's REM sleep, the portion of slumber when most dreaming occurs,

characterized by rapid eye movement, muscle twitches, and an active brain. Though no one knows precisely why there is REM sleep, it has been suspected to be involved with learning and memory. REM sleep was thought to have evolved relatively recently in mammals and independently in birds. But a new study on the world's weirdest animal shows

that REM sleep has been around more than 100 million years longer than previously thought. The platypus, it turns out, is the supreme REM sleeper, getting about eight hours of REM shut-eye a day.

Neuroscientist Jerome Siegel of the UCLA Medical Center traveled to Australia specifically to study snoozing platypuses. An influential study in the