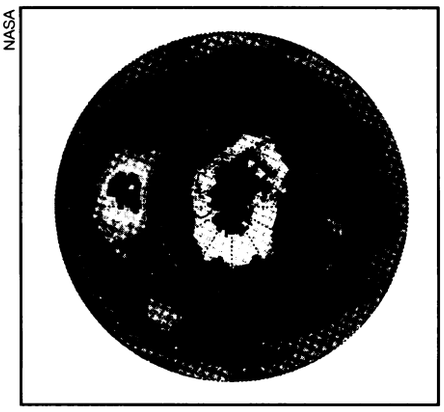
NASA



Satellite image of Antarctica's ozone hole, which includes center black area and the white, gray, and black areas around it. Ozone there ranged from 100 to 175 Dobson units on Sept. 30.

have a margin of error of plus or minus 4 Dobson units.

Satellite records suggest that the rate of ozone decline has almost matched last year's, says Arlin J. Krueger of NASA's Goddard Space Flight Center in Greenbelt, Md. He and his colleagues recorded a low of 100 Dobson units of ozone on Sept. 30 and expect it will drop to last year's low of 90, he says. The margin of error is 10 Dobson units.

The ozone hole has become more extensive in the past few years. It now covers about 23 million square kilometers, roughly the size of North America.

— *T. Adler*

A keen view of vision: Seeing cone cells

At the back of an eye lies the retina, a tissue-paper-like membrane studded with rod and cone cells. Those cells facilitate sight by transforming light energy into electrical signals, which are then sent to the brain. Yet seeing those cells in action is difficult. While scientists study retinal cells removed from eyes donated for research, they have been unable to watch single vision cells at work in living subjects.

Now, Donald Miller, David Williams, and G. Michael Morris, all researchers at the University of Rochester (N.Y.), have brought astronomical technology to bear on the retina. Using lasers and charged coupled devices (CCDs) originally designed for stargazing and military applications, they have observed individual, live cone cells with a resolution as small as 3 micrometers, they said this week at a meeting of the Optical Society of America in Dallas.

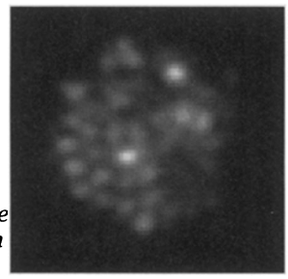
"This resolution is three times greater than the resolution that people have attained so far," says Williams. "It's the highest resolution of photoreceptors in living retinas for an image taken outside the eye. This offers a new benchmark for how fine a structure one can see in living retinal tissues. And we're hoping to see more detail in blood vessels, receptors, and other types of eye cells."

To obtain such images, the researchers use an argon laser to bounce a quick flash of light off the retina. They then capture the reflected beam with a CCD, which funnels the signal into a computer for processing and display. The patient remains awake the whole time.

To improve the instrument's acuity, Williams and his colleagues will incorporate an "adaptive optics" system used by astronomers to help compensate for atmospheric disturbances when viewing light from distant stars. This system has effectively compensated for the optical distortions that arise within an eyeball and obscure a high-resolution view of the retinal cells.

Williams sees two potential uses for this imaging method. One is to help physicians diagnose and chart the course of certain eye diseases — such as macular degeneration or retinitis pigmentosa — before disabling symptoms appear. The second possible use is scientific. "We don't yet understand very well how light is absorbed into the pigments of photoreceptors," Williams says. "Maybe by looking at these receptors we can gain some insight into how light passes through the retina's photoreceptive layer."

— *R. Lipkin*



Miller *et al.*

A cluster of live cone cells near the center of a human retina.

Food allergies linked to ear infections

Just the mention of otitis media makes many parents of young children cringe. Otitis media — middle ear infection — affects two-thirds of children in the United States by age 2 and is the most common cause of acquired hearing loss in children. Many get these earaches again and again, despite treatment with antibiotics.

This recurrent condition does not always cause pain, but just the buildup of fluid behind the eardrum can impair hearing and lead to permanent damage. Consequently, some 670,000 children a year wind up with tubes surgically implanted into the middle ear to keep it ventilated. Overall, otitis media represents a $3.5 billion-a-year U.S. health care cost.

Food allergies may underlie many of these multiple episodes, reports Talal M. Nsouli, an allergist at the Georgetown University School of Medicine in Washington, D.C. He and his colleagues tested 104 children with recurrent ear problems for food allergies. About a third proved allergic to milk, and another third reacted to wheat, with a total of 81 children having some allergy to a food they often ate. The scientists then had parents keep those children from eating the offending food for 4 months. Seventy children got better. "Those who avoided those foods had significant clearance of the ear," Nsouli says.

Then parents added those foods back to the diets of the 70 children. Within 4 months, the middle ears became clogged in 66 of the children, a result that reinforces the link between food allergies and persistent ear problems, Nsouli and his colleagues note in the September ANNALS OF ALLERGY.

During the testing period, the researchers periodically examined the ears, checking the eardrums in particular, and monitored the buildup of fluid inside the ear using an instrument called a typanometer. They tried to account for many of the factors that make the evaluation of treatments for this condition so difficult, Nsouli adds.

"Hopefully, most of the ear, nose, and throat doctors will start looking at these patients in light of allergies," says otolaryngologist Richard E. Linde of the George Washington University School of Medicine in Washington, D.C., and one of the study's coauthors.

Considering food allergies in children with these problems "might prevent surgery and might prevent permanent damage," Nsouli says.

— *E. Pennisi*

Cross-sectional view from the top of the head shows ways allergenic foods may affect the middle ear. (1) Stuffed-up noses cause fluid from the throat to move into the middle ear. (2) Nasal fluids drain into the Eustachian tube. Or (3) that tube swells shut because of an allergic reaction, causing a negative pressure in the middle ear.

Nsouli *et al.*