Beaming with a double-decker microlaser

It's easy to overhear words whispered by someone standing near the interior wall of a circular, domed chamber. The whispers echo throughout the gallery, making the words audible to any eavesdropper elsewhere along the wall.

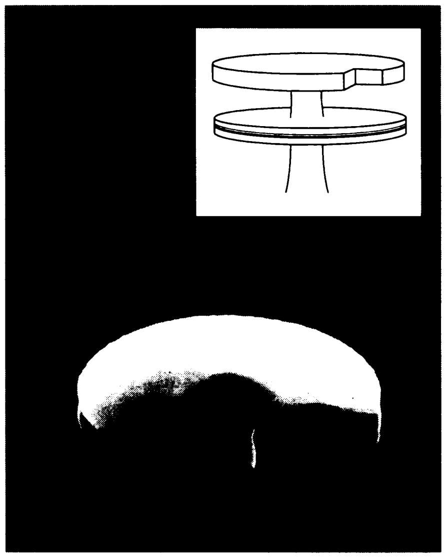
Infrared light injected into a microscopic semiconductor disk follows a similar course, circulating along the disk's edge for long periods with little diminution in intensity. Such a device can act as a laser, spraying coherent light that fans out from the disk's rim (SN: 11/23/91, p.327).

Now, a team of researchers at Northwestern University in Evanston, Ill., and the University of California, San Diego, has found a way to channel the emitted laser light into a beam without greatly degrading the quality of the disk in which the light initially circulates.

Northwestern's Seng-Tiong Ho and his collaborators accomplish this feat by placing a second disk atop the first, joined by a narrow neck. Photons slowly leak from the bottom to the top disk. These photons then leave via a notch cut into the upper disk (see illustration).

"This seems to be an effective way to get the light out in a directed manner," Ho says. "Eventually, we want to make the light come out vertically."

Constructed from disks only 5 micrometers in diameter and mounted in air on a pedestal, this double-decker microlaser is considerably smaller than the tiny semiconductor lasers that scan discs in compact-disc players. "We can make them as small as 2 or 3 [micrometers] in diameter," Ho says.



Ho et al.

Electron micrograph of a double-disk microcavity laser. The upper disk guides photons generated in the lower disk to an aperture from which the photons emerge as a beam (inset).

Ho described the group's experiments at an Optical Society of America meeting, held this week in Dallas. Further details will appear in a forthcoming issue of Applied Physics Letters. — *I. Peterson*

Better leukemia survival

Once invariably fatal, acute myeloid leukemia (AML) still kills most of its victims. But a study involving 1,088 patients treated at medical centers across the country now indicates that more aggressive chemotherapy may help this cancer's younger sufferers.

At the most effective dose studied, the new regimen is often so toxic that many patients, especially those over age 60, cannot tolerate it. But for those who can, rates of long-term remission appear comparable to those seen in patients receiving bone-marrow transplants from a marrow-matched sibling. That's currently the most promising treatment option, but it's not available to many.

In AML, which hits 6,400 people in the United States each year, blast cells — produced in the bone marrow — don't mature as they should into granulocytes, a type of infection-fighting white blood cell. Oncologists usually use chemotherapy to kill those blast cells, starting with some combination of cytarabine and at least one other drug. The 65 percent of treated patients who then go into remission, or show no signs of disease, typically begin a period of maintenance therapy. At this stage, researchers tried increasing the dosage.

In the new study, they gave about one-third of 596 patients who entered remission daily doses of 100 milligrams of cytarabine per square meter of body surface area for 5 days. The researchers gave the other volunteers either 4 or 36 times as much drug. Patients received four courses of their regimen, each at least a month apart.

The older the individual and the higher the dose, the more likely a patient was to suffer seizures and other forms of cytarabine's potentially irreversible neurotoxicity, report Robert J. Mayer of Harvard Medical School in Boston and his coworkers in the Oct. 6 New England Journal of Medicine. But among those age 60 and under who tolerated the drug, the probability that an individual would survive diseasefree for at least 4 years climbed from 24 percent among those on the 100-mg dose to 29 percent in the 400-mg group and to 44 percent in the megadose group. — *J. Raloff*

The seasonal ozone decline continues

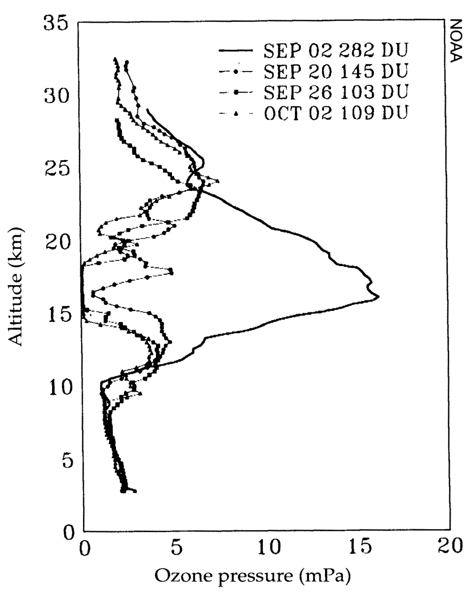
It's that time of year again, when the ozone over Antarctica grows almost as sparse as the hair on a balding man's head and provides little more protection against the sun's cancer-causing rays.

So far, however, this year's ozone measurements are producing a confused picture. Data taken from a U.S. spectrometer flown aboard a Russian satellite suggest that the protective layer has thinned almost as much as it did last October, researchers told Science News. But data from instruments on balloons sent into the stratosphere hint that things aren't that bad.

The ozone layer helps guard Earth from the sun's damaging ultraviolet radiation. In the spring, when sunlight finally reaches Antarctica, the protective blanket of gas thins as light activates chlorine and bromine particles, which help break apart ozone molecules. By November, as the polar stratosphere warms, the hole begins to mend. Concentrations of ozone should bottom out around Oct. 10, says Samuel J. Oltmans of the National Oceanic and Atmospheric Administration in Boulder, Colo.

Last October's record-breaking 70 percent drop in ozone probably resulted in part from the dose of sulfur dioxide that Mt. Pinatubo shot into the stratosphere when it erupted in 1991 (SN: 10/16/93, p.247).

In the last 2 weeks, the low recorded by researchers using the balloon instruments was 103 Dobson units of ozone — about 10 percent more than last year at the same time, Oltmans says. This slight increase doesn't suggest a permanent comeback for ozone, he warns. The data



NOAA

The graph shows ozone measurements taken at different altitudes between Sept. 2, when the depletion began, and Oct. 2.