nedy's criticism of women's health care a step further. He said that the over-prescription of "minor tranquilizers," including Valium, and of the hormones estrogen and progesterone "have the potential to and actually succeed in making healthy women sick." Women aged 20 to 39 are given 2.2 times more tranquilizers than men the same age, he said. The continued prescription of DES (diethylstilbestrol), a synthetic estrogen used both as an emergency contraceptive and to prevent miscarriage, and believed to cause cancer in women and their children, "is an open and shut case of malpractice," he said. The Food and Drug Administration has included a warning in DES packages against possible hazards, but Wolfe called these warnings inadequate. He went on to condemn the use of estrogens and progestins in general. Women using these hormones appear to have higher rates of cancer, blood clots, hypertension, gall bladder disease and, as reported in the July 21 LANCET, higher cholesterol and triglyceride levels that could lead to heart attacks (SN: 4/14/79, p. 247).

Author Barbara Seaman, co-founder of the National Women's Health Network, agreed with Wolfe on the dangers of using hormones as birth control. She accused the FDA of ignoring "harmless methods of contraception," such as the cervical cap (widely used in Europe), which is safe, cheap and convenient. The cap fits over the cervix and acts as a barrier to sperm, as does the diaphragm, but the cap has one important advantage — it requires little or no spermicide. For that reason, Seaman says, U.S. companies that manufacture the diaphragm are not interested in developing the cap. Spermicidal jelly is the profitable feature of the diaphragm, she says. Further, the cap could be fitted by a paramedic or a nurse, eliminating costly visits to a doctor. An FDA panel on contraceptives has classified the cap as "not to be used as contraceptive ... because its effectiveness for this use has not been proven in the United States." Research is now underway in many states.

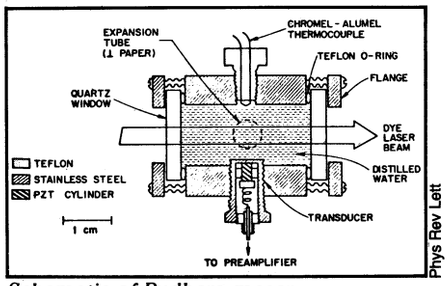
Seaman also added to Wolfe's testimony on drugs, noting that neuroleptics (anti-schizophrenic agents) such as Thorazine, Mellaril and Prolixin, have been associated with a seemingly permanent nerve disorder known as "tardive dyskenesia" in about half the patients who use them. Two-thirds of the prescriptions for neuroleptics are written for women, she says.

Eleanor C. Smeal, president of the National Organization for Women, blames "the male domination of the medical establishment" for the situation. While the high frequency of certain operations unique to women — hysterectomies, ceasarean sections and radical mastectomies — is only beginning to be questioned, she warned that continued sex-stereotyping of women in medicine affects their families as well — women are the medical "brokers" for them also. □

Vive la maser: New French development

When they were first developed in the 1950s, they opened up an entire new field of physics. Masers finally enabled scientists to generate a beam of radiation at a precise wavelength and phase, in this case microwave radiation. The idea was soon extended to the visible spectrum, resulting in the maser being overshadowed by its fraternal twin, the laser. But even though masers haven't been in the public eye, the devices in use today perform a variety of tasks — from keeping time as atomic clocks to amplifying signals in satellite communications. And now a group of French scientists at the Laboratoire de Physique de l'Ecole Normale Superieure in Paris have developed a maser system that can detect the emission of a single microwave photon and count individual atoms. They're calling it a Rydberg maser.

Conventional masers typically work with a billion to 100 billion atoms or molecules in the maser cavity. These atoms are excited to higher energy states and then stimulated to radiate that excess energy at the same frequency. The new maser, on the other hand, works with only about 1,000 atoms in its cavity. The French researchers, led by M. Gross, were able to do this by using "Rydberg atoms." These are atoms whose outer electrons have been excited to very high energy states far from the nucleus, making them look almost hydrogen-like. Such atoms are very strong absorbers and emitters of microwave radiation. In the experiment reported in the July 30 PHYSICAL REVIEW LETTERS, the Rydberg atoms were a stream of sodium atoms excited by two dye-laser beams.



Schematic of Rydberg maser.

Because of the small number of atoms involved in producing the maser's microwave pulses, the power output was very low, only about 10^{-13} watts in each pulse. Since it is difficult to directly detect such a small burst, it was detected by an indirect method called field-ionization. After the sodium atoms left the maser cavity, they were ionized in an electric field, accelerated and then detected by an electron multiplier. By observing the ionization current over a certain time interval, the researchers could see how many atoms were in each different energy state, including the ones that had emitted their energy in a maser pulse.

The field ionization method is so sensitive that it can be used to count single Rydberg atoms in each energy level and as a result indirectly detect the single microwave photons that they emitted. Thus, the researchers envision its use as a very sensitive microwave spectrometer. One reported wavelength of their maser pulse was 1.49 millimeters. But with selective filtering, they believe it can be used as a tunable, broadband microwave source for Rydberg-state spectroscopy. □

H_2O: An absorbing story

Close your books, take out a pencil and answer this question. Which of the following physical constants have been known for a long time: (a) speed of light, (b) mass of electron, (c) absorption coefficients of water, or (d) all of the above.

If your answer was d, you're wrong. Over the years, surprisingly enough, researchers have come up with different numbers in describing how the various wavelengths of visible light are absorbed by water. Some absorption coefficients differ by as much as a factor of two. One problem has been trying to correct for light scattering by particles suspended in the water.

But now C. Kumar Patel and Andrew C. Tam of Bell Laboratories claim they have made the first reliable absorption spectrum of pure water at 21°C using an opto-acoustic technique they developed last year. As described in the July 26 NATURE, they shone a laser beam through a quartz window into a 1-inch stainless steel cell containing triply distilled water. As the light energy was absorbed, it suddenly expanded the water, setting up acoustic waves. Those waves were then measured by a piezoelectric transducer submersed at the bottom of the cell. In this way, absorption was measured directly without having to worry about scattering. The absorption coefficients were simply related to the ratio between the absorbed energy detected by the transducer to the total energy of the laser pulse.

Using a tunable dye-laser, Patel and Tam measured absorption from the blue end of the visible spectrum to the red end. The energy of green light, for example, would be cut in half after it traveled 20 to 30 meters through water. Bell Labs is interested in such information because of its application to transmitting laser signals underwater. "It would be possible to transmit light over a kilometer underwater," says Patel, "for conveying small amounts of information." He would now like to apply his opto-acoustic technique to studying solids, such as the glassy materials used in fiber optics. □