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simply cannot guarantee safe burial for 10,000 years. We cannot even bury our household garbage safely for 20 years.

So why not put radioactive waste in carefully constructed "buildings" above ground? There would be no danger of people forgetting about them in 500 years. They could be monitored much more easily. They could be repaired and improved more easily as that became necessary and possible. And if anyone finds a use for this energetic waste, which is how many waste problems have been solved, it would be more readily available.

But if we feel we simply must bury it, why not put it in that part of an earth's plate that is being subducted back below the crust? That should get it out of sight for a while.

Richard S. Blake
East Falmouth, Mass.

Several people involved in the Yucca Mountain project suggested to me that, if for no other reason than politics, most high-level waste will remain stored above ground, in spite of the current investigation into underground disposal. As for subduction zones, in the 1960s some scientists suggested these locations might be suitable for waste disposal, but the idea has received scant consideration recently. Instead, many nations are looking at the regions in the middle of the oceanic plates, where a thick layer of sedimentary ooze rests on the ocean floor. One proposal is to shape the waste canisters as projectiles, so they will penetrate deep into the ooze and remain shielded from the corrosive seawater. — R. Monastersky

Deadly ducts?

Comfort-control systems as central heating and cooling are excellent means of transmission of airborne illnesses ("Tight buildings, more airborne disease," SN: 4/16/88, p.251), as it is inevitable that these systems will become septic unless maintained in a hygienic condition. That becoming septic is inevitable does not mean that it is normal, as they can be controlled successfully. Fouled systems cause many superficial and systemic mycoses as well as bacterial diseases, as the systems are entirely opportunistic.

There are danger signals such as fouled outlets, decreased operational efficiency, condensation around air outlets and overflow of condensate at the unit, to name a few. That so little instruction is given on installation and maintenance is not only a major health problem but also a national disgrace.

It is hoped that your article will attract attention from occupational, environmental and public health officials and that the need for instruction and controls can be emphasized. Unless the focus of transmission is identified and removed, nothing else can be effective, as the exposure to products of growth within the units is continuous, prolonged, cumulative and hazardous. One health official told me, "It scares me to think how many illnesses and deaths could be traced to such a source in the immediate environment if we just looked far enough."

Andrew C. Askew Jr.
Ardmore, Okla.

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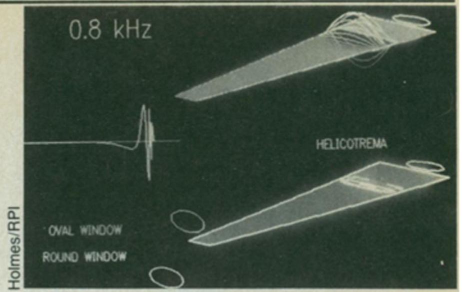
Sounds in the unwrapped inner ear

The details of how the inner ear converts sound waves into electrical pulses for transmission to the brain have long puzzled researchers. As one step in studying this process, mathematicians have been working with physiologists to develop computer models that simulate how various parts of the ear work. Such information would aid in the design of hearing aids and speech recognition systems. One recently developed model of the cochlea, a spiral-shaped, fluid-filled organ in the inner ear, illuminates how sound waves of different frequencies excite fibers in the basilar membrane, a platform running down the cochlea.

The difficulty in building such a model, says Mark H. Holmes of the Rensselaer Polytechnic Institute in Troy, N.Y., is in matching the mathematics with experimental data from physiological studies. Holmes' model of the cochlea extends his earlier work on eardrum motions (SN: 5/17/86, p.311). In his animated film, the cochlea is shown cut open and unrolled to make it easier to see what happens to the basilar membrane as the frequency of the incoming sound wave changes (see illustration). "As you change frequencies, the area of stimulation changes," says Holmes.

Now, Holmes and his colleagues are developing mathematical equations that describe how the ear canal leading to the eardrum influences sound waves and how specialized hair cells embedded in the basilar membrane convert mechanical movement into electrical signals. "We feel we have the major components of the system," says Holmes, "although we haven't yet put them together into a whole-ear model." — *I. Peterson*



Holmes/RPI

This frame from an animated film shows three views of the effect on the basilar membrane of an 800-hertz sound wave at one instant in time. In the process of hearing, a sound wave enters through the round or oval window, then travels along the basilar membrane toward the helicotrema. The wave's amplitude varies along the membrane, reaching a peak where the membrane's fibers respond most strongly to that particular frequency.