Biomedicine

Lethal Dead Sea

The Dead Sea packs a double whammy for drowning swimmers — if they survive the effects of inhaling water, the high salt content in the water they swallow can kill them hours or days later. The Dead Sea has 36 times the concentration of calcium, 26 times the magnesium, 10 times the chloride and 9 times the potassium of the Mediterranean Sea. Drowning in such a buoyant body of water is "almost impossible," note Israeli researchers from Hadassah University Hospital in Jerusalem in the January ARCHIVES OF INTERNAL MEDICINE.

But of eight people they examined who nearly managed it, all had abnormally high levels of dissolved salts in their blood, and one died as a result. The researchers suggest that people who nearly drown in very salty water be checked for salt absorption and treated if necessary with diuretics, stomach washes or dialysis.

Fat rats have rich diet to blame

Rats can be obese without overeating — all it takes is a diet high in fat, according to Lawrence B. Oscai, Margaret M. Brown and Wayne C. Miller. And, even when given the opportunity, the overweight rats don't overeat — a finding that runs counter to previous studies.

The three University of Illinois at Chicago researchers gave three groups of rats unlimited access to chow in which either 42, 50 or 60 percent of the calories came from fat. Each of the three groups took in approximately the same number of calories as a control group eating an 11 percent fat diet, the scientists report in the current issue of GROWTH (Vol. 48). Yet all three groups of high-fat consumers weighed 32 percent more, and their carcasses were 51 percent fat, compared with 30 percent fat in the control group. "They're eating the same amount of calories but getting fatter," says Miller.

The findings are relevant to humans: With 40 percent of the calories in the typical U.S. diet coming from fat, getting that percentage down may be a key to weight loss, Miller says.

But why would the same number of calories cause varying degrees of obesity? The Chicago group found that rats on a high-fat diet metabolize fat differently from those on a normal diet, and is now trying to detail the enzymatic changes.

Asbestos in babies

Even babies have asbestos in their lungs, according to a letter in the March ARCHIVES OF PATHOLOGY AND LABORATORY MEDICINE. While autopsies on adults have shown that most people have pulmonary deposits of the flame-retardant mineral, this is apparently the first report in babies, says Abida K. Haque of the University of Texas in Galveston, who with two co-workers reported the finding.

Asbestos deposits over time can limit lung function and cause a deadly form of cancer called mesothelioma. Until more studies are done, Haque is not willing to predict the long-term implications of the finding.

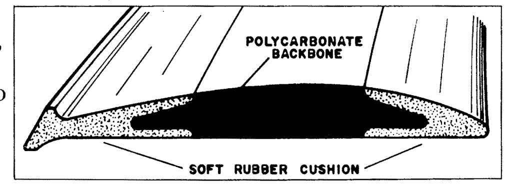
The Texas researchers looked at lungs from 17 babies aged 2.5 to 10 months who died of sudden infant death syndrome (SIDS) or infectious diseases. Five of the 10 SIDS babies and one of the others had asbestos in their lungs; some of them had levels as high as adults with mesothelioma.

The babies may have been exposed to asbestos insulation, or they may have picked it up from having been in old incubators fitted with asbestos-containing gaskets, she suggests. The preponderance of asbestos in SIDS babies shouldn't be construed as a cause of SIDS, the researchers note. They suggest the SIDS babies may, for an independent reason, have encountered more asbestos, or that their lungs may have been less able to clear the mineral than those of the other infants.

Technology

Ringing in a world record

It slices through air with the greatest of ease. It sails so far that it holds the world record for the longest flight — 1,046 feet, 11 inches — by a thrown, heavier-than-air object. It makes a Frisbee® look like a tired dinner plate. This newly invented flying ring, called the Aerobie, is quickly spinning into the hands of aerodynamics fans throughout the United States.



Adler

What makes the Aerobie go, says inventor Alan Adler, who lives in Palo Alto, Calif., and lectures in electrical engineering at Stanford University, is a special rim along the ring's outer edge. "The trick was to make the ring aerodynamically stable so that it would fly straight," he says. "The challenge was to design an airfoil section that had one characteristic flying forward and a different characteristic flying backward."

When Adler began this project a year ago, no one knew whether such a design was feasible. For stability, the ring's center of lift had to be over its center of gravity. This perfect balance could be achieved if the trailing half of the ring had a higher lift-slope (the ratio of a change in lift to a change in the angle of attack) than the leading half. But because the ring would be spinning, no known airfoil had the right characteristics to work as both a leading edge and a trailing edge.

"I nearly abandoned the quest on several occasions," says Adler, "but kept going and eventually tested an outer rim design which had a spoiler lip on the upper edge to reduce the lift-slope of the leading half. The model was more stable than anything I had seen before." He tried different rim heights and angles before he came up with his thin, flat, record-setting ring. With this design, says Adler, "the Aerobie works over an amazingly broad range of speeds." And even a 6-year-old can quickly and easily learn to toss it.

Bowing to a digital sound

Pluck a violin string, and it rings. Draw a bow across the string, and a distinctively different, rich, sweet sound fills the air. But how does rosin-dusted horsehair, sticking and slipping as it passes over a metal or gut string, create these sounds? Although a few researchers have studied this question during the past century, what happens when a violin string is bowed is still mysterious. Now, physicist Gabriel Weinreich of the University of Michigan in Ann Arbor and French researcher René Caussé are using a computer as a "digital bow" to study the vibrations that a violin bow produces in a string.

In their experiment at a center in Paris for the scientific study of music, the researchers are simulating the way oscillations build up in a string because of a bow's ability to respond instantaneously to the string's motion. "We are dealing with a feedback system that is purposely unstable," says Weinreich.

As a long wire vibrates back and forth, a sensor measures its velocity about 32,000 times every second. These data go to a computer, which looks up the postulated frictional force that a bow would apply to a string moving at each particular speed. The force is translated into an electric current that is sent through the wire. A small magnet at the wire's bowing point converts this current into a force on the wire, which then moves, and the process repeats itself.

By changing the tables stored in the computer, Weinreich and Caussé can test different theories about the role friction plays in the interaction between a violin bow and a string. "I'm now getting a much better insight into what the old theories predicted," says Weinreich. "I hope to go beyond that soon."