

rial below the interface. He also found that when a buffered acid attacked calcium carbonate, it dissolved at the acid front, precipitated just ahead of the acid front and dissolved well ahead of this front. The same thing could happen to marble, which consists primarily of calcium carbonate, under the right conditions.

Featherstone says tooth enamel is a porous material, which is not chemically inert. It consists of crystals of a mineral related to hydroxyapatite held in a matrix of water, protein and lipid. Tooth decay occurs when bacteria in the plaque on the tooth metabolize sugars to produce organic acids, such as lactic acid, that attack the enamel.

Featherstone has been studying the physical chemistry of dental decay, especially diffusion processes. He is interested in learning how to slow down decay processes and repair damage, functions that saliva performs naturally. He says the mathematical model he and Cussler developed is a big step in understanding tooth decay. Now, they are designing experiments to check and refine the model and trying to come up with chemically useful methods that can be applied to all porous solids. So far, Cussler and Featherstone have investigated more than 20 systems that show analogous behavior.

Cussler and Featherstone are both struck by how simple the basic idea behind their model is. It's the kind of insight that gets other scientists to say, "Why didn't I think of that?" □

## Violence on TV: A ten-year update

Early evidence that televised violence sparks aggression in some viewers has gained support from a new update of the Surgeon General's 1972 report on Television and Social Behavior. After reviewing more than 300 studies of television's effect on viewers, Eli Rubinstein, a member of both the Surgeon General's earlier advisory committee and the update task force, told SCIENCE NEWS that "the vast majority of the studies confirm the original conclusion that there is a causal relationship between televised violence and later aggression."

Rubinstein and colleagues on the review committee outlined the update in Los Angeles last week at the annual meeting of the American Psychological Association. Full details of their report, which also includes analyses of the cognitive and social effects of heavy TV viewing on the elderly and the very young, should be published by December, according to spokesmen for the National Institute of Mental Health, which sponsored the update.

In 1972, Surgeon General Jesse Steinfeld called for "appropriate remedial action" by broadcasters to limit violence in children's programming (SN: 4/1/72, p. 214). "If

his statement was warranted then—and I believe it was—it is even more so now," says Rubinstein. "Not only is there further documentation of the adverse relationship between TV violence and later aggressive behavior, the newer research shows influences of television on the viewer much beyond the issue of violence."

A census of characters and their occupations in both prime time and children's television programs shows that television paints a discrepant view of the world, says Alberta E. Siegel, a Stanford University psychologist who contributed to the update. Three times as many men as women appear on television, where the most common jobs are in law, medicine and police work, she reports.

"Scientists are rare in the TV world," Siegel says. "Much commoner are prison guards, jail matrons, detectives and judges." Stereotypes of the elderly are perpetuated on most programs, she says, where "the elderly are typically shown as ineffective, sexless and pitiable."

As a window on a world with which children have little experience, television strongly shapes the social attitudes of young viewers, Siegel asserts. "There's fairly good evidence that children accept as authentic the portrayals that they see on television."

J. Ronald Milavsky, vice president for social research with the National Broadcasting System, dismisses the idea that TV should reflect statistical reality as an unsupported assumption. "I don't think entertainment should be held to that sort of standard," he told SCIENCE NEWS, pointing out that a content analysis of Shakespeare's plays would show that they do not accurately reflect the experiences of an average citizen in Elizabethan England.

Results of Milavsky's three-year longitudinal field study of several hundred children and teenagers and the long-term effects of their viewing habits will be published for the first time in the Surgeon General's update. "I think more children have had nightmares from fairy tales read to them than from television shows they've watched," says Milavsky, who reports that his study found no evidence that television violence was causally linked to the later development of aggressive behavior patterns.

Jerome L. Singer, director of the Family Television Research and Consultation Center at Yale University, believes a frightening TV program can have much stronger effects on a child than a frightening fairy tale because of the usual absence of an adult during a child's TV viewing. However, parental reassurances can boost the positive effects and buffer negative effects of any TV program. With evidence that children as young as six-months-old are already attentive to television, he says parents need to recognize TV as more than an extraneous and occasional intruder in their child's life. □

## A bone to pick: How to date bones

In 1974 a group of scientists using a new method for dating fossils raised a prospect that sent shivers down the spines of archaeologists worldwide: Human nomads could have come to North America during an ice age as long as 70,000 years ago. These findings by Jeffrey Bada of Scripps Institution of Oceanography, Roy Schroeder, also then of Scripps, and George Carter of Texas A & M University, are challenged in the Aug. 28 SCIENCE by James Bischoff and Robert Rosenbauer of the U. S. Geological Survey (USGS) in Menlo Park, Calif.

The issue is not when did anatomically modern man come to North America, but rather, how old are the samples in question? The USGS scientists used a dating technique called uranium series dating. A living organism does not contain uranium, but absorbs it from the soil that surrounds it after death. You can learn the sample's age if you ascertain, from decay rates and the accumulation of decay products, how long the uranium has been in the sample.

To confirm that the uranium series tests for these fossils are valid, Bischoff and Rosenbauer double-checked their results by testing two independent decay schemes. U-238 decays into thorium-230, and U-235 into protactinium-231. "If there is any perturbation in the decay schemes, the dates won't agree," Bischoff said. "Our results not only are internally concordant, but they are in good agreement with the geological evidence."

Bischoff and Rosenbauer find that the Del Mar skeleton samples are about 11,000 years old, compared to the 48,000 years cited by Bada and his colleagues. The Sunnyvale sample is found to be about 8,300 years old, compared to 70,000 years.

Bada and his colleagues had used a method called amino acid racemization because fossils older than 45,000 years cannot be dated by the standard carbon-14 dating procedure. The amino acid racemization process is based on the fact that amino acids can exist in two mirror-image forms, left- and right-handed, or L- and D-isomers. Only the L-isomers are found in living protein, but after an organism dies, the amino acids slowly change to the D-form. This ratio can be measured and the age of an organism calculated.

Bada told SCIENCE NEWS that the ages indicated by uranium series testing are minimum ages. "What you're really dating with the uranium series is when the uranium became fixed in the sample, not the sample itself," he said. Because the real ages of the samples could be tens of thousands of years older, Bada says, Bischoff's data substantiate his previous findings. "The uranium series method hasn't been used extensively," he said. "It's fraught with problems." □