Radon: Cigarette's link to cancer?

"During the 16 years since the Surgeon General's first report on smoking, intense research activity has been focused on the carcinogenic potential of the tar component of cigarette smoke," Thomas Winters and Joseph Di Franza write in the Feb. 11 NEW ENGLAND JOURNAL OF MEDICINE. However, "[C]onspicuous because of its absence," say the pair of researchers at the University of Massachusetts Medical Center in Worcester, "is research into the role of the radioactive component of cigarette smoke." And that radiation can be considerable. The scientists report that "the radiation dose to the bronchial epithelium ... is 8,000 millirem per year — the equivalent of the dose to the skin from 300 X-ray films of the chest per year."

Vilma Hunt of Penn State, a pioneer in cigarette-radiation studies, agrees with their contention that radiation in cigarette smoke may play a promotional or initiating role in the triggering of cancers but she objects vociferously to their claim that radiation's role in cigarette-related cancers has been ignored over the past 16 years. Maybe physicians aren't aware of such work, she said, but "I'd flunk any student in my class who made that claim."

Edward Martell and Kevin Sweder at the National Center for Atmospheric Research in Boulder, Colo., represent one team focusing on the cigarette-radiation connection. Their work suggests that all lung cancers could involve alpha-[particle] induced lung transformations," Martell told SCIENCE NEWS.

Studies in the 1960s suggested lead-210 and polonium-210 — two radioactive species present in cigarette smoke — might collect in lungs to promote cancer growths. The lead and polonium were believed to enter tobacco as airborne fallout on leaves and as a natural contaminant of phosphate fertilizers absorbed through tobacco roots.

But new work presented recently at a mining conference by Martell suggests that radioactive radon — a naturally occurring decay product of radium, released by soil, rock and groundwater — may, when cycled through a burning cigarette, present the most dangerous health hazard of all. While all cigarettes contain radioactive contaminants which may provide a health hazard, they are not as dangerous as the radioactive species — notably polonium-214 — deposited at forks in bronchial passages when radon decay products are inhaled through a burning cigarette, Martell says. In other words, if one must smoke, he should avoid doing it in a radon-rich environment — such as many energy-efficient homes (SN: 11/7/81, p. 301) or brick structures. —*J. Raloff*

Electrical healing: 'A major advance'

One of the most gratifying things for a biomedical research observer is to watch a new treatment evolve into a clinical success. And such now appears to be the case for the electrical healing of recalcitrant leg fractures, according to a report and an editorial in the Feb. 5 JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION. The report comes from one of the pioneers of the technique, C. Andrew L. Bassett of Columbia-Presbyterian Medical Center in New York City, and his co-workers. The editorial was written by Clinton L. Compere of Northwestern University Medical School in Chicago.

Eight years ago, as part of their ongoing research into the electrical healing of fractures, Bassett and his colleagues devised a noninvasive means of exposing a leg fracture to electricity as compared to implanting electrodes in the leg. It consisted of placing a fractured leg between coils producing a pulsing electromagnetic field. The field in turn induced weak electric currents in the fractured leg bone (SN: 5/4/74, p. 287). The same year they also launched a study to determine how effective this so-called pulsing electromagnetic field (PEMF) treatment was in healing stubborn leg fractures; they eventually expanded the study to include not only their own patients but those being treated by some 500 orthopedic surgeons at other American medical centers and by orthopedic surgeons at foreign medical centers.

Results from the study to date (on over 1,000 patients) show it to be 80 percent effective, Bassett and his team report in JAMA. Specifically, the success rate was 81 percent at Columbia, where Bassett and his colleagues performed the technique, and 79 percent and 76 percent, respectively, at foreign and other American centers where orthopedic surgeons performed the technique in consultation with Bassett. The success of the method was not affected by the length of time patients had been disabled, how many operations had failed to heal their fractures or whether they had infections from their fractures. Nor did the technique produce any detectable undesirable side effects. "Given a negligible or nonexistent risk and a method as successful in producing union as the more risky surgically invasive methods (including electrodes)," Bassett and his team conclude, "a case can be made for PEMF's as the primary treatment for ununited fractures."

In his editorial Compere says the PEMF method is just as successful as surgery in healing unhealed fractures and calls it "a major advance in traumatic orthopedic surgery." But he points out that it isn't the only technique capable of healing fractures electrically. —*J. A. Treichel*

Fossils span evolutionary gap

Fossils of three different animals from the early Cretaceous period about 120 million years ago each represent critical steps in the transition from primitive to more advanced fauna, scientists report. Kenneth Carpenter of the University of Colorado Museum in Boulder, and Robert Bakker of Johns Hopkins University, report that the fossils were embedded in rocks extracted in 1978 from Como Bluff, Wyo., where a segment of the fossil-rich Morrison Formation is exposed. "What we found appears to be a community that bridges the gap between primitive Jurassic fauna and the more advanced Cretaceous fauna," Carpenter told SCIENCE NEWS.

One of the animals, a chipmunk-sized multituberculate whose proposed name is "zofiabataar geographica," may have been the earliest advanced leaf-eating mammal. When the first multituberculate emerged 150 million years ago, it had a vertical bite and bladed teeth ideal for slicing plants and, possibly, insects. Thirty to forty million years later, when the newly found specimen lived, the jaw had changed. Like modern rodents, which it resembled in appearance, zofiabataar had a sliding jaw that enabled it to shred plants, but it still possessed the primitive teeth of its ancestors. As Darwinian theory predicts, the discovery fills a necessary and expected evolutionary slot. The advanced multituberculate emerged about 20 million years later. The animal possessed what Bakker calls a "Cuisinart" apparatus, in which the performance of its sliding jaws was enhanced by multi-bladed teeth — perfect for shredding plants. Though the multituberculates died out as rodents gained dominance, the family was extraordinarily successful, co-existing with the dinosaurs and outliving them by 25 million years.

An animal discovered last summer is a shrew-like insectivore that Carpenter says possessed intermediate features between primitive and more advanced insect-eating mammals. The species, to be called "simpsonipauper fortis," had fewer but more varied teeth than its ancestors, a sign of evolutionary progress. In humans, for example, wisdom teeth gradually are being left behind.

A two-inch-long turtle skull may represent the first family of fully terrestrial turtles. Other turtles found in the formation have long, narrow, and very shallow skulls, well-suited for coping with soft aquatic vegetation. The new specimen, to be named "comobaena medicinebauensis," possessed a short, broad, and deep skull, a design better adapted to cutting the tough fibers of land plants. The research results were presented in November at a meeting of the Society of Vertebrate Paleontology. —*C. Simon*