SCIENCE & TECHNOLOGY

Washington's War on Cancer

"The Politics of Cancer" by Elizabeth Whelan, in *Policy Review* (Fall 1979), The Heritage Foundation, 513 C St. N.E., Washington, D.C. 20002.

Most measures by federal regulators to protect workers and consumers from cancer-causing chemicals overlook obvious facts about cancer. So contends Whelan, a researcher at the Harvard School of Public Health.

The Food and Drug Administration bans any food additive that induces cancer in any animal species at any dose level. The Occupational Safety and Health Administration (OSHA) has even broader criteria. OSHA considers a chemical a "confirmed carcinogen" if it increases the incidence of tumors or shortens "latency periods between exposure and onset of tumors"—*malignant or benign*—in either humans or two species of test mammals; one species if the test can be duplicated.

These criteria err on three counts, avers Whelan.

First, they target manmade chemicals only; substances such as egg yolk, egg white, caffeine, and Vitamin A—known carcinogens in at least one mammalian species—are ignored. Second, they depend on the rather unscientific notion that "mice are little men." Not all animal carcinogens (i.e., sodium penicillin) cause cancer in humans. And third, the regulators wrongly assume that most cancers are caused by pollutants in our food and environment. The International Agency for Research on Cancer puts the percentage of cancer contracted in the workplace at only 1 to 5 percent. And since the use of certain food additives has increased, the stomach cancer rate has actually declined. Some 30 to 35 percent of all cancer deaths are "directly attributable to cigarette smoking," asserts Whelan. Another 30 to 35 percent may be due to high caloric and fat diets.

There may well be "health-related and aesthetic" reasons for cleaning up the environment and the workplace and for purifying our food, she concludes, "but the risk of cancer is not one of them."

Molecular Detectives

"False Start of the Human Parade" by Adrienne L. Zihlman and Jerome M. Lowenstein, in *Natural History* (Aug.-Sept. 1979), P.O. Box 6000, Des Moines, Iowa 50340.

"Give me a tooth and I'll reconstruct the animal," boasted early 19th-century French zoologist Georges Cuvier. In tracing human and animal evolution, most anthropologists today are more cautious.

The pelvis is "probably the most diagnostic bone in the human line," write Zihlman, an anthropologist at the University of California, Santa Cruz, and Lowenstein, associate clinical professor of medicine at the University of California, San Francisco. It can tell researchers if a suspected human ancestor walked upright or on all fours. A tooth, on the other hand, can be deceiving; the teeth of the prehistoric chalicothere, for instance, led anthropologists to believe it was an ancestor of the horse until they discovered that it had claws instead of hoofs. But a controversy now rages over whether molecular, rather than bone, structure provides the clearest clues to human evolution.

Molecular anthropologists, notably Vincent Sarich and Allan Wilson of the University of California, Berkeley, compare the combinations of amino acids in proteins of living species to deduce how long ago the species diverged from a common ancestor. Amino acid arrangements in humans, chimpanzees, and gorillas are almost 99 percent identical—making all three as closely related as the grizzly bear and the polar bear. Based on the few differences in protein structure, molecular anthropologists have concluded that "humans, chimpanzees, and gorillas diverged from a common ancestor between 4 and 6 million years ago"—not 10 or 12 million years ago, as previously thought.

Molecular analysis, say the authors, destroys the once-accepted hominid credentials of *Ramapithecus,* a small creature (4 feet tall) that walked upright about 10 millions years ago. *Ramapithecus* had been reconstructed on the basis of teeth and jaw fragments (aligned much like those of modern-day *Homo sapiens)* discovered in India in 1932. Now, the authors conclude, nothing remains of him "but his smile."

Metals with 'Memories'

"Shape-Memory Alloys" by L. McDonald Schetky, in *Scientific American* (Nov. 1979), 415 Madison Ave., New York, N.Y. 10017.

There is a "new family" of alloys that can be fixed to assume shapes on temperature command. Practical applications will likely range from artificial joints in human limbs to hinges on greenhouse windows that automatically open to admit fresh air in hot weather.

A so-called shape-memory alloy is one whose atoms undergo a specific shift from one crystal arrangement to another with a change in temperature. For example, a wire made of one of these alloys may be bent into cloverleaf shape and then heated until its atoms assume a "high temperature configuration" (the "parent" phase). Rapid cooling rearranges the atoms of the wire (without altering its clover shape) into the crystal pattern "martensite." Once cooled, the wire may be crushed into a wad, but when reheated to "parent" temperature, the cloverleaf will reappear.

Though first demonstrated with brass (a mixture of copper and zinc) in 1938, the "shape-memory effect" did not lend itself to useful application until the 1960s, when Nitinol—a costly nickel-titanium alloy—was developed by U.S. Navy scientists. Nitinol has since been used to trig-