

some of the report's points:

- “. . . continued failure to meet committed schedule dates . . .”
- “. . . late, incomplete and incorrect engineering releases . . .”
- “. . . the main level of corporate interest appears to be . . . financial . . .”
- “. . . programs can be done, and done better, with fewer people . . .”
- “. . . there is little confidence that NAA will meet its schedule and performance commitments within the funds available for this portion of the Apollo program . . .”

## Water Paradox

As delegates from more than 70 nations were preparing for the Water for Peace Conference in Washington May 23-31, United States support of a major Water for Peace Project—the International Hydrological Decade—has been slashed to the bone by Congress.

The IHD, a U.S.-inspired program for worldwide water resource studies, is expected to help provide much of the background information on which developing nations can base their water resource programs. In a sense, it is the cornerstone of President Johnson's Water for Peace promise to the world.

**Of \$2 million requested** to help pay the U.S. share of the costs of the 95-nation program, only \$500,000 was approved by the House of Representatives.

The International Hydrological Decade was first proposed by a panel on hydrology of the Federal Council for Science and Technology. It is a 10-year program designed to promote scientific research on water resources and train hydrologists from water-poor countries. Much of the \$2 million requested was to go for exchange of scientists among the participating nations and for fellowships for students from have-not countries.

The House Appropriations Committee's report declares, “this in essence is a foreign aid program for water. The Committee does not feel that this is an appropriate time to initiate a greatly accelerated international water program.”

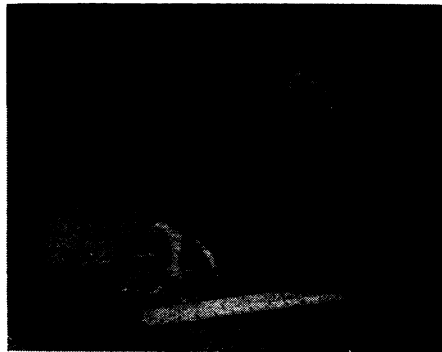
Dr. Raymond Nace, chairman of the U.S. National Committee for the IHD and a research hydrologist with the Geological Survey, says the budget slash will curtail, but not stop, the program.

## New World Man

Man is supposedly a recent arrival in the New World, dating only from about 12,000 years ago. Though archaeologists have suspected he may

have been here longer, they have until now failed to turn up hard evidence.

That evidence may have been found in stone tools unearthed from an old riverbed near Mexico City. Their age is not yet firmly established, but the tools appear to be some 40,000 years old, which would mean man inhabited the Americas during the ice age.



Fremont Davis

Mastodon jaw from Valsequillo site.

“**This is premature** but it's beginning to look awfully good,” says Dr. J. O. Brew, director of Harvard University's Peabody Museum and general director of the archaeological program.

Since 1962 archaeologists Cynthia Irwin-Williams, representing Harvard, and Juan Armenta Camacho of the University of Puebla in Mexico have been turning up the artifacts—hide scrapers, leather-working instruments and projectile points—from an ancient geological deposit known as the Valsequillo Gravels, near the town of Puebla.

The tools are unsophisticated and generally unlike any other known New World artifacts. Moreover, they were found in association with the remains of such Ice Age animals as mammoth, mastodon and dire wolf, as well as extinct forms of camel and horse. Nearby beds of fossil shells date from at least 35,000 years ago.

Here the evidence ends and deduction begins—a process Dr. Meyer Rubin of the U.S. Geological Survey likens to “building a tower of tooth-picks.”

**The tools themselves**, being stone, could not be carbon-dated. Therefore, dates had to come from analysis of volcanic ash that overlies some of the sites, and from the shells.

“In no case,” says Dr. Rubin who did the carbon 14 analysis, “did I date a piece of charcoal from the same outcropping that contained the tools.” Surmising their age called for involved geological comparisons between the strata that contained the tools and those containing the volcanic ash and fossils. Dr. Rubin is convinced his dates on the ash—as old as 40,000 years—are correct. The loose link, he said,

is the geological correlation.

Like the rest of the Harvard team, Dr. Rubin is extremely cautious in accepting the idea that human life existed in the New World during the Ice Age. Anything prior to 12,000 years ago would mean glacial man, and so far the evidence has been mighty scarce. For 15 years, says Dr. Rubin, he has been dating such “evidence.” Each time it has fallen apart. “There was always something fishy about it.” But he concedes that this find is “pretty good.”

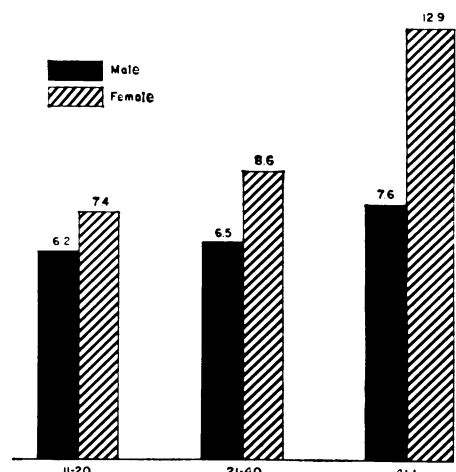
Meanwhile, the Harvard team proceeds with more correlations and more radiocarbon dating. Even if they establish the existence of glacial man, however, they won't know who he was. His own bones haven't surfaced.

## New Smoking Tactic

The tobacco industry's ways of getting people to buy cigarettes have undone the Government's attempts to get them to quit.

So the Government has changed its tactics. Instead of calling for no cigarettes, it is pushing industry for safer ones.

In closed Congressional testimony, made public last week, Health, Education, and Welfare Secretary John W. Gardner said the campaign against



Absenteeism parallels cigarette use.

smoking “has not worked very well so far.” The only advance since the 1965 release of the Surgeon General's report, Smoking and Health, is that doctors are smoking fewer cigarettes, Gardner said.

**The Secretary testified** before the House Appropriations Subcommittee. He told subcommittee chairman Daniel J. Flood (D-Pa.) that the cigarette industry countered the Government's \$10 million campaign against smoking with

a \$250 million effort to promote sales.

"We believe the next step is the publication of tar and nicotine content," Gardner said. The Federal Trade Commission has a laboratory in which it plans to test all cigarettes for tar and nicotine content. Its findings will be published quarterly, indicating results by brand name. Hopefully, this will stimulate competition among tobacco companies for a "safer" cigarette, Government officials say.

Another Government report issued last week linked smoking to loss of work time. Smoking workers spend a third more time away from their jobs because of illness than nonsmokers, according to a survey conducted in 1964 and 1965 by the National Center for Health Statistics.

Surgeon General William H. Stewart announced the survey of 42,000 homes. It shows for the first time, he says, the extent of the relationship between illness, disability and smoking. Survey statistics show that smokers and former smokers of both sexes are more likely to suffer from heart disease, emphysema, sinusitis and peptic ulcers.

The Tobacco Institute, Inc. of Washington, D.C. was quick to criticize the survey, charging "most of the information in the report is based on self-diagnosis and secondhand information."

## Viruses and Cancer

Cancer researchers have entered a new round in their fight against the still elusive human leukemia.

By pitting one type of cancer virus against another, they have found new techniques that enable them to isolate and identify leukemia-causing viruses in chickens and mice. Now, they plan to use these sophisticated methods to study viruses in dogs and cats; they are moving up the mammalian ladder to their eventual goal—man.

**Striking similarities** between leukemias in chickens and mice were reported at the annual meeting of the National Academy of Sciences in Washington, D.C. "We have everything going for us to indicate that leukemias and sarcomas in several species of animals are likely to make a common pattern in the mammalian kingdom," says Dr. Robert J. Huebner of the National Institute of Allergy and Infectious Diseases. The trick is to use the sarcoma virus to reveal the presence of the evasive leukemia virus.

Leukemia is a cancer of the blood-forming organs. A sarcoma is a malignant tumor made up of connective tissue such as muscle. It is only within the last few years that scientists have shown certain sarcoma viruses, such as

the Rous Sarcoma Virus, are defective—that is, they lack some genetic component essential to their ability to reproduce. The defect can be compensated by a helper virus that completes the defective virus by becoming its coat or envelope, thereby enabling it to replicate. Apparently, some leukemia viruses can play the role of helper to the defective Rous Sarcoma.



University of Wisconsin

The bottom of the research ladder.

**This knowledge**, verified by tests on chickens and mice, lies behind methods used to discover elusive leukemias. The defective sarcoma virus reproduces when wrapped in the viral coat of the leukemia virus. Dr. Huebner and others have used this test to hunt for various leukemia viruses. On a limited scale, Dr. Huebner plans to study human leukemias and sarcomas in tissue culture, though chances are slim there will be a pay off in human studies until more is learned from animal work.

## Time Reversal Search

The idea that time's direction of flow cannot be determined by any physical experiment was once deeply ingrained in the thought and theories of scientists.

That was the case until, in 1964, physicists found that time might sometimes be a one-way street. Since then, they have searched long and hard for confirmation or disproof of the indirect evidence that, under certain conditions, time has a preferred direction of flow.

**Scientists say** that time is a sequence of events that customarily follow one another. If this sequence can be made to reverse itself, as was suggested by the 1964 experiments, then to physicists and the subatomic world in which they work, time would be running backward.

Equipment is not yet sufficiently sensitive to make a direct test for time irreversibility, but experiments now

underway are seeking additional, although still indirect, evidence.

At Howard University last week Nobelist Dr. C. N. Yang of the State University of New York at Stony Brook outlined four kinds of experiments being conducted at various laboratories for proof or disproof of time reversal invariance among the so-called weak interactions, such as occur in radioactive decay or when some subnuclear particles disintegrate.

All four involve the breakup of the K-2 meson, a member of the family of particles that act as nuclear glue, binding neutrons and protons together so that they form nuclei.

A different kind of an experiment looking for time reversal invariance, but in electromagnetic interactions, is underway at Los Alamos Scientific Laboratory. The electromagnetic force acts between charged particles, as in holding negative electrons in orbits around a positive nucleus.

Dr. Enloe T. Ritter reported to the American Physical Society meeting in Washington (SN: 5/6) preliminary results of experiments he and Dr. Roger B. Perkins are conducting to test time reversal in the radioactive decay of rhenium. He said that the first results from a month's run suggested that time was not reversible in this electromagnetic reaction. The experiment will last a total of six months.

All the fundamental laws of physics, including relativity and quantum mechanics, are time-reversible. That is, the same physical laws apply whether the sequence of events runs backward or forward, in somewhat the same sense that actions in a motion picture are reversed when the film is run backward.

**That time is not reversible** is difficult for scientists to believe. There is "no conceivable proposal" to cover such an eventuality, says Dr. Yang.

Until 1957, scientists had considered three symmetries to be inviolate. They believed reactions between nuclear particles could not be distinguished from their time-reversed, antimatter or mirror images. This is called the CPT theory.

The C, or electric charge, is a way of distinguishing matter from antimatter. The P, or parity, tells right-handed from left-handed, and the T, or time, distinguishes the direction in which a sequence of events occurs.

Then scientists discovered in 1957 that a particle and its mirror image do not follow exactly the same rules—parity is not invariant in all cases. Dr. Yang and Dr. T. D. Lee of Columbia University shared the 1957 Nobel Prize in Physics for suggesting the search for examples of nonconservation of parity.

The shock wave following this dis-