

were found show evidence of having been transported in water.

Finding stone tools with hominid fossils has, in the past, been a criterion for deciding the man-like culture of the creatures. Dr. T. Dale Stewart of the Smithsonian Institution in Washington, D.C., says that there is no definite date when toolmaking came into existence. So far, what sets the *Australopithecus* apart from ape-like creatures like the *Ramapithecus* is the fact that the *Australopithecus* began to stand erect, began to use his hands and eventually learned to make and use stone tools.

But no evidence of stone-toolmaking has yet been found with these latest man-like fossils. If there were tools with the fossils, they, too, would probably have been transported. And Prof. Karl W. Butzer, a member of the expedition from the University of Chicago, feels if there were tools they probably would have already been found. Prof. Howell, only a little less pessimistic, believes "there is still a 50-50 chance of finding tools."

Because there is an absence of evidence of toolmaking in this find and because the exact date of tool using has not been determined, a new theory may be in the making. If no tools are found in future work, says Prof. Howell, "it will require some substantial modifications in certain theories of hominid origins, which have tended to stress capabilities for toolmaking behavior as being critical in the success of the earliest adaptation of Hominidae to life in open country environments."

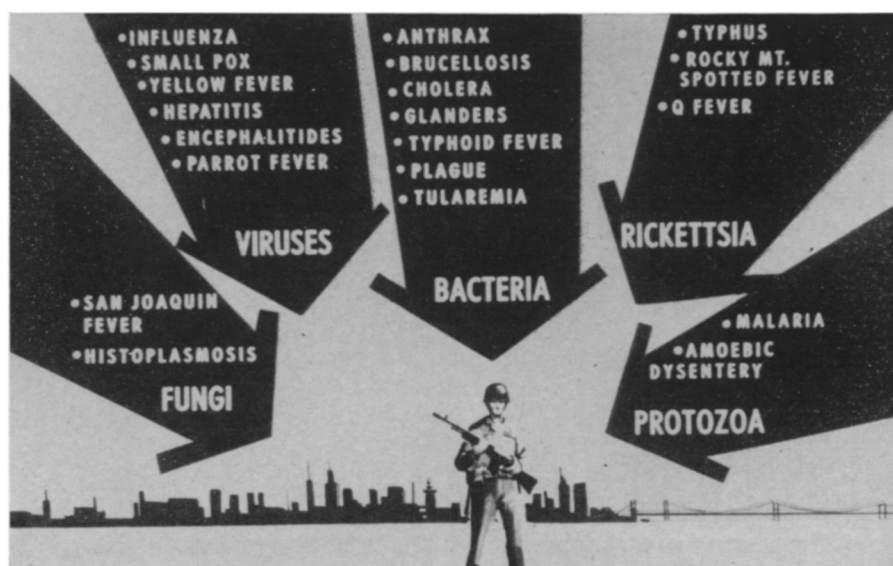
Howell's expedition has found large collections of fossils of mammals and other vertebrates in the deposits: elephants, black and white species of rhinoceroses, three-toed as well as true equids, hippopotami, pigs, giraffes, a primitive camel, antelope and diverse varieties of carnivores. The Omo beds also revealed the first and oldest documented occurrence in East Africa of the camel, a species which appears at a comparable time in Asia and eastern Europe. There is also evidence that horses first appeared in East Africa about two million years ago.

The expedition has clarified the identity of previous paleontological finds in the area and nearly tripled the total number of mammals known. Most of the mammals that have been found are extinct species.

Prof. Howell's expedition will be returning this summer to the region to look for evidence of toolmaking. Further digs for prehuman man seem unlikely in that area. The next step is finding another area with still older strata so that the gap to knowledge of man's ancestors may be closed even more. ◇

HIDDEN WARFARE

Tracking CBW



Army

Public health in reverse: They come without warning from man-made vectors.

Within the last 10 years, the Army's chemical, biological and radiological weapons program dropped the word "radiological" to become known as Chemical and Biological Warfare (CBW). But the public, and for that matter the Congress, hardly noticed it. However, more than mere semantics was involved.

The distinction today is that the radiological weapons of yesterday have evolved into colossal offensive, defensive and tactical nuclear systems quite apart from the little-heard-from development of gas and germ war capability.

But in recent months, largely as a consequence of the massive sheep kill caused by a nerve-gas accident in Utah (SN: 4/6/68, p. 327), CBW has been getting its share of attention.

Currently, a handful of Congressmen and Senators are concerned that too little is known about the military's CBW research and development program or its position in military thinking. Its budget is hidden, and except for a rare disaster such as the Utah mishap, it is little publicized.

Most vocal among the program's critics is Rep. Richard D. McCarthy (D-N.Y.). So far, a series of briefings, including discussions with the secretary of defense, the secretary of state and classified conferences with the Army provided him little of substance, but rather amplified his belief in the need for a deeper probe.

Foreign policy implications led McCarthy to discuss his concern with Sen. J. W. Fulbright (D-Ark), chairman of the Senate Foreign Relations Committee, who responded by crowding

the CBW issue into an already busy schedule of committee business. An initial hearing was held April 30; more will be held—presumably after the Senate vote on missile defense systems next month.

In addition to the more ominous spectre conjured by the possibility of global warfare involving CB weapons, McCarthy and Fulbright are concerned about the very real hazard associated with the research, production, transportation and stockpiling of these agents.

Last week, McCarthy raised a strong protest against what he described as Pentagon plans to tow 1,100 railroad cars full of World War II poison gas across country, load them aboard two old Liberty Ships, and sink them at sea. McCarthy said the Defense Department had received a waiver of normal precautions from the Department of Transportation for the shipment to the port at Earle, N.J., from Rocky Mountain Arsenal in Colorado, Pine Bluff Arsenal in Arkansas and Edgewood Arsenal in Maryland.

McCarthy expressed concern not only for marine pollution, but for the fact that the trains—restricted to 35-mile-an-hour speeds—would have to pass through some urban areas, including Indianapolis, Ind., and Elizabeth, N.J.

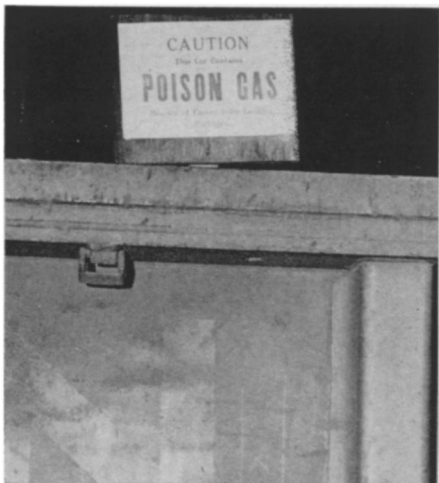
Because of the atypical forms of pathogens which have been adapted to the various criteria of weapon design, scientists are unable to predict the effects of biological agents. A very real possibility exists that these organisms have been so altered that there would be no way to contain the spread of

disease from an intended target, or from a source of accidental contamination.

Also unknown is the actual amount spent in the chemical and biological field. McCarthy cites a figure of \$350 million for fiscal year 1969, but says that the figure is highly deceptive because of the secrecy which surrounds the program. Research activities, scattered throughout Federal facilities, some 60 university laboratories, and industrial organizations, are channeled through budgets far removed from warfare.

McCarthy has cited 3,300 accidents at Fort Detrick, the Army's biological warfare research center, located near Frederick, Md. Detrick, he says, has one of the poorest records among major biological institutions for infections among its employes and that some danger is posed to neighboring communities. In 1951, one bacteriologist there died of anthrax contracted in his laboratory.

Besides the Utah accident, where nerve gas escaped from a testing area at the Dugway Proving Grounds, re-



The Denver Post

Nerve gas stockpile in freight yard.

sulting in the death of more than 6,000 sheep, there was a mishap at the Pine Bluff Arsenal in Arkansas, where a toxic substance contaminated a nearby river, forcing the Army to buy up land along the stream. And a 1950's Colorado leakage episode led indirectly to a Colorado man-made earthquake controversy (SN: 4/22/67, p. 377).

Dr. Matthew S. Meselson, a consultant since 1963 for the U.S. Arms Control and Disarmament Agency, told the Fulbright committee CBW has not received the "far-sighted analysis it deserves." In a wide-ranging review of CBW programs, their implications in national policy and the areas of ambiguity which must be clarified in order to establish rational Federal controls, he recommended that the U.S. cease its use of tear gas, nausea-producing gases and defoliants in Vietnam.

The use of chemicals in Vietnam however innocuous their designation by the military, loosens the barrier between policies of "some gas" and "no gas," he declares.

McCarthy charges that the U.S. is clearly engaging in chemical warfare, and has thus changed its self-imposed restriction on military application of poisonous gases designed for use against human beings.

The Fulbright committee accepts its role as a proper forum for CBW investi-

WORLDWIDE PUZZLE

Soft water and heart disease

Japanese water is soft, with less than 42 parts per million mineral content. In the early spring of 1957, Japanese scientists showed data linking some quality of river water with death rates from cerebral hemorrhage, which is the first cause of death in Japan.

In late 1959 studies were made to test a possible relation between drinking water and death rates from cardiovascular disease in the United States. When the Japanese and American experiences were considered together, the conclusion was drawn that some factor in drinking water related to its hardness or softness was in some way related to death.

A report from Canada in the April 10 NEW ENGLAND JOURNAL OF MEDICINE throws new light on the subject. Investigators at the University of Toronto found almost double the number of deaths from ischemic, or blood deficiency, heart disease in soft water areas than in hard water regions.

But this applies to sudden deaths and not to those occurring in hospitals some time after the attack. Thus, they emphasize, water hardness may influence the mechanism of death rather than the underlying disease.

One possible cause of the soft water syndrome may be a metal, cadmium, in piped water. Cadmium is a constant contaminant of the zinc used to galvanize iron pipes; it is dissolved by soft, acidic surface water. For example, enough cadmium can be dissolved by lemonade stored in a galvanized pail to cause acute cadmium poisoning in persons drinking the beverage.

Galvanized pipes have been used in dwellings for more than 100 years, but since World War II they have been increasingly displaced by more expensive copper, which is much easier to install and cheaper in the end. Members of the present older generation living in soft water areas and exposed to cadmium from galvanized pipes could have accumulated cadmium with a resultant tendency to high blood pressure. If

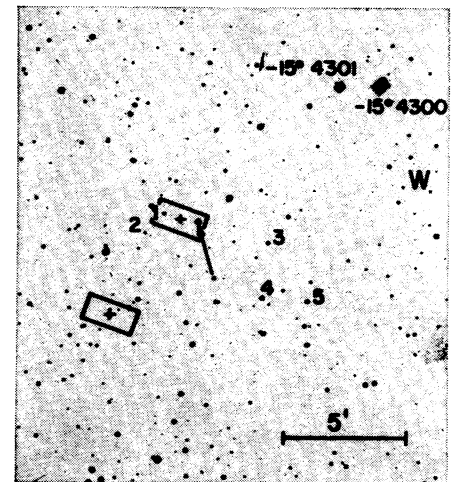
gation in the same way the ABM discussions have come to the committee's attention: because of foreign policy considerations. The ABM, however, is clearly the heavyweight of the two; it will probably continue to occupy a position of priority for most of the committee's time so that CBW will simmer along with no indication of how much inertia must be overcome, or what direction Congressional interest will take when it begins to move through the committee rooms of Capitol Hill.

this is the water factor, influence on cardiovascular death rates can be expected to decrease in countries where copper pipes are replacing galvanized iron.

The Canadian doctors, T. W. Anderson, W. H. Le Riche and J. S. MacKay, caution that it is possible that their findings are entirely fortuitous, and that the differences they found in studying three regions are unrelated to water hardness. They might be the result of other factors such as climate, population density and socioeconomic levels. ◇

X-RAY STARS

Ganging up on Sco X-1



Caltech

Sco X-1 (arrow) by visible light.

X-ray stars, concentrated celestial sources of X-rays, have been known to exist for less than 10 years. The nature of the physical processes that enable them to put out the strong signals that they do is one of the important outstanding questions in astrophysics. They have been observed in a variety of frequencies, but seldom in the concerted way necessary to provide really comparable readings.

Now hoping to discover what makes