

## A double antidote

As Army trains carrying some 12,540 concrete-encased rockets full of GB nerve gas (SN: 8/8, p. 113) moved funerially through the South this week, most of the nation worried about the trains' brakes and other mechanical matters. So thick is the cloud of military secrecy wrapped around the nerve gas that almost no one knew that two antidotes—not just the one publicly acknowledged—were part of the medical kits and other equipment on the train. Two antidotes had also been shipped to every hospital along the route, where life-saving measures in the event of a disastrous leak of the gas had been set up by the Army evacuation director for each area involved.

The information would have greatly reassured pharmacologists and others who work at the periphery of this highly secret field. News reports mentioned only one antidote: the well-known and widely useful drug, atropine. As most neuropharmacologists know, atropine blocks some of the first effects of nerve gas poisoning. But it does not restore breathing, which stops within a few minutes after exposure to GB.

Breath must be reactivated by putting exposed persons into a respirator. The second antidote is the key treatment. This is an oxime, 2-PAM (pyridine-2-aldoxime methiodide), which reactivates the enzyme put out of action by GB.

**Atropine and 2-PAM** are both standard Army issue, according to Dr. Van Sint, scientific director of the medical laboratories of Edgewood Arsenal, the Army's chemical warfare center. Atropine is part of all Army emergency gas mask kits, in minute syringes. These are provided as injectors the size of cigarettes, which soldiers quickly press against their bodies at the first alarm or sign of nerve gas. PAM is not a self-administering antidote but is made available by Army medics.

While nerve gas was a discovery of the German chemical industry, the reactivator antidote, 2-PAM, was put together by two physical chemists, Irwin Wilson and Sara Ginsburg, working with a distinguished refugee from Hitler's Germany, neurochemist David Nachmansohn at Columbia University.

All known nerve gases are organophosphorus compounds. Developed as insecticides, the compounds were quickly recognized as the most lethal poison gas the world had yet seen. This is because the phosphorus links to, and blocks, acetylcholine esterase, a key enzyme of the cholinergic nervous system. The antidote, 2-PAM, peels off the phosphoryl groups from the enzyme, reac-

tivating it. Wilson and Ginsburg synthesized the antidote after analyzing the physical forces on the surface of the enzyme.

But even with both antidotes available, the gas presents a terrifying threat to humanity if it escapes. In actual disaster, the time margin for application of both first and second antidotes would be small. Nerve gas is colorless and odorless and is quickly absorbed by the skin and eyes as well as through the respiratory tract.

An improved reactivator antidote, toxogonin, two linked molecules of PAM, has been developed but is apparently not yet available for clinical use. □

### SCIENCE NEWSBRIEFS

#### Auto suits

Suits were filed by 15 states against the four biggest American automobile manufacturers last week to force more rapid improvements in pollution-free engines and pollution-control equipment.

The joint action filed in the Supreme Court is directed against American Motors, Chrysler Corp., Ford and General Motors. The Automobile Manufacturers Association also was named.

The states also are asking the Court to order installation of pollution-control devices at manufacturers' expense on all of their vehicles sold in the last 17 years. □

#### Hands off highway funds

Use of a portion of the Highway Trust Fund for special mass-transit projects by the states appears doubtful now that the National Governors Conference has returned the resolution to committee.

The Nixon Administration-backed proposal is a prelude to obtaining transfer-authority legislation next year. Transportation Secretary John A. Volpe had suggested 15 to 25 percent of the fund could be used, but highway lobbyists termed the recommendation a "raid."

A motion to shelve the plan was carried 23 to 12 by the governors at their Lake of the Ozarks, Mo., annual meeting. Proponents vowed to make one more attempt before adjournment to garner support for a revised resolution. □

#### Radiation suit

The controversial question of whether the State of Minnesota or the Atomic Energy Commission has jurisdiction to set radiation standards for a Northern States Power Co. nuclear power plant (SN: 4/4, p. 341) will move into a Federal District Court in Minneapolis Oct. 5.

The State of Minnesota wants to set stricter standards for radioactivity re-

leased into the air and water than does the AEC. Several other states have joined with supporting briefs, and the case is regarded by environmentalists as one which will produce a landmark decision. □

#### Artificial upwelling

Three years ago Drs. Robert Gerard and J. Lamar Worzel of Columbia University's Lamont-Doherty Geological Observatory proposed a novel scheme to pipe ashore deep, cold ocean water in the Virgin Islands. The complete system they envisioned would stimulate fish production by bringing microscopic nutrients to the surface, produce fresh water by atmospheric moisture condensation and help generate electrical power.

Last week at least the first of those three proposed applications was fulfilled. An artificial upwelling project, making use of a mile-long pipeline into the ocean, was dedicated at a marine biological station established by the two scientists on the north shore of St. Croix. Dr. Oswald A. Roels of Lamont-Doherty is directing the project, which is supported by a National Science Foundation Sea Grant. The nutrient-rich water will be used to create a phytoplankton bloom in closed fish ponds constructed on shore. Later stages of the experiment will study the other uses proposed by the Columbia scientists. □

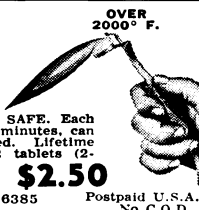


#### Makes Fun Of Work!

New, Vermont-Made Wheelbarrow-Cart is so perfectly balanced on two big wheels, so easy to roll, you guide it with just one hand even with 300 lb. loads! No backstrain! No struggle! No load fall out! Several models include build-yourself kits. Handsome, rugged, handcrafted appearance. Perfect (gift) for any him, her, family, or business. For FREE CATALOG by first class mail, write now to Garden Way Research, Dept. 2818, Charlotte, Vermont 05445.

#### SUPER JET SOLID FUEL BLOWTORCH

A Jet Age Creation  
NO PREHEATING—STARTS AT ONCE. You can solder, silver solder, braze, anneal or harden, form glass with this amazing new torch. Non-explosive! FAST, CLEAN and SAFE. Each tablet gives high heat for ten minutes, can be extinguished & relit. Lifetime guarantee. Super Jet and 12 tablets (2-hour supply) with directions. Extra tube of 12 tablets 50¢.  
THE BIRK MFG. CO.  
Box 297E, Waterford, Conn. 06385



\$2.50

Postpaid U.S.A.  
No C.O.D.

FILMS on SCIENCE  
and MEDICINE  
for rental—\$6. per film  
F. A. C. S. E. A.

972 5th Avenue, New York City 10021

Catalogue upon request