FROM GENEVA

## Mussels in the pipeline

"It's no good just killing them and having dead blighters in the pipe."

William Wood, an engineer with the World Health Organization's Environmental Sanitation Division, has had a look at a jarful of trouble for water systems—Drissensia polymorpha, or zebra mussels.

The jar of mussels came from Turkey, but millions of such small mollusks grow in public water systems in various areas throughout the world, materially cutting their efficiency—and hurting efforts to provide plentiful, clean water.

**Killing the blighters** won't do the job, but so far, he says, no other feasible solution is readily at hand.

The fast-growing water program of the United Nations agency now has 128 civil engineers and scientific consultants in the field on more than 30 water projects around the world. Britisher Wood is responsible for Europe and the Middle East.

Turkey needs help particularly because the mussels, about one-inch long, are narrowing water main diameters drastically and roughing the bores which must remain smooth for good carrying capacity.

"The Americans have similar trouble with the so-called Asiatic clam in the Far West," Wood says. Other clogging mollusks are reportedly common throughout the Middle East and widespread across Europe.

They carry no danger of disease, as far as anyone knows.

But no one has really checked to see what bacteria can breed inside the zebra mussels.

**The mechanical problem** starts with free-swimming larvae entering the water pipes. Their invasions apparently vary with the season, weather, even time of day.

Wood and his colleagues think that careful research projects might reveal times when specialists could stop mussel entry. If there were a peak period, they could stop the water flow then.

Another hunch: the young may travel only at certain depths, and engineers might set the intakes above or below them.

WHO technical assistance to Turkey hopefully will produce useful information for the other nations. The Russians, with similar troubles in the Caucasus, have done good work in this field, says Wood.

A chlorination system, they find, is the best defense. The Turks will adopt such a technique, temporarily at least.

Other research suggests the possibility of special coatings for pipes to prevent mollusks from clinging.

"But we must learn more about these creatures," Wood says. "They are too small for screens.

"Of course if water treatment plants were near the sources, there'd be no problem. They don't go through the usual treatment works. But we can't put treatment plants everywhere.

"In Turkey they're usually about 40 kilometers away from the intake. It's like New York, where all the raw water is brought down a long pipeline and treated near town." *David Alan Ehrlich*

NEW ZEALAND

## Nuclear age begins; long pull ahead

Mountainous New Zealand now produces 84 percent of its electricity by water power, the rest from fossil fuel. But the demands projected for the future far outstrip these sources, so the islands are going nuclear.

Within 10 years, for example, the power demands of the city of Auckland alone will equal the present needs of the whole country.

So New Zealand plans to begin nuclear energy generation with a station tentatively sited in the Hauraki Gulf area about 1977. E. B. Mackenzie, general manager of the New Zealand Electricity Department, recently completed a world trip investigating the advantages of nuclear power.

**The type of reactor** which appears most suitable for local conditions is a Canadian design using unenriched uranium as fuel and heavy water for the moderator, he reports.

This combination permits fuel manufacture procedures simple enough to be carried out in New Zealand. It also allows the use of a low-cost fuel which does not need to be treated after irradiation, thus avoiding transport to a treatment plant.

Besides these advantages, Mackenzie says, this type of reactor is economical, when designed to generate in the vicinity of 250 megawatts. Since New Zealand's first nuclear station may contain four machines of this size, the cost of fuel at a 70 percent load factor would be $11.2 million a year in overseas funds for an enriched fuel.

The unenriched fuel, on the other hand, would cost $8.4 million a year, half of which would be spent in New Zealand during its manufacture.

**While the capital** cost of this type of reactor may be higher than an enriched-fuel machine, when its whole life is considered the fuel costs become the paramount concern.

As well as having these immediate advantages, this reactor produces, as

(*see p. 475*)

(Continued from p. 471)

a by-product, a fissionable material suitable for use as fuel in the projected fast breeder reactors now under development.

Mackenzie, looking 20 years ahead, says New Zealand may find it advisable to move into the very sophisticated techniques of fuel processing to recover this by-product fuel and use it in the fast type of reactor now under test at Dounreay in the United Kingdom.

**A program** requiring nuclear electricity generation within 10 years, starting with practically no nuclear experience, is a major project which began with the initial training of two engineers in Australia last year.

This year three New Zealand electricity department engineers and a health department scientist are going to the Atomic Energy Authority in Britain for 18 months. Two Ministry of Works engineers are already with the Authority. *William A. Scholes*

FROM SWEDEN

## Satirical physicist turns librettist

The well-known Swedish plasma physicist Hannes Alfvén has entered a new field—as opera librettist.

It all started, Alfvén says, when his grandson, Gabriel, aged five, wanted a new story. So Prof. Alfvén invented a story about a computer.

The story got a bit out of hand for Gabriel, and ended instead as a satire, published pseudonymously, entitled "The Case of the Great Computer" in which human beings were rationalized out of existence.

The opera will receive its premier performance at the Royal Swedish Opera in 1969. Music will be by Swedish composer Karl-Birger Blomdahl—with electronic elaborations by several of Alfvén's scientific colleagues.

## Environment engineers

Sweden is training its first group of 16 environmental engineers—specialists who will deal professionally with such problems as water and air pollution—thanks to an economic recession that has plagued the country since 1965.

Three hundred out-of-work engineers applied for the 12-month re-training course planned by the National Education Board. The first 16 selected will study such subjects as community planning, business economics and the medical and legal aspects of environmental engineering. *H. J. Barnes*

FROM MEXICO

## Fishmeal revolution

**Fishmeal plants light enough to be** mounted on small shrimp boats have been developed with promise that they can change Mexico from an importer to an exporter of the commodity.

The republic now imports some $8.8 million worth of fishmeal fodder and fertilizer a year, while its shrimp and fish fleets throw away huge amounts of fish suitable for the process.

**The plant** is produced in three basic models for output of 1, 5 and 24 tons daily. The highest capacity plant weighs 1.8 tons and is 9.84 feet long by 16.40 wide. A similar capacity United States plant weighs approximately 32 tons, measures approximately 30 by 60 feet, and is virtually ruled out for use aboard fishing vessels.

The one-ton plant weighs about 750 pounds and can readily be mounted on smaller shrimp and fishing boats.

According to engineer Carlos Diez de Sollano, his fishmeal plant takes about six seconds to produce protein-rich meal from the moment raw fish are fed into it. Protein content of fishmeal produced by the Mexican plant runs 71.26 percent, as compared with 60 percent for Peruvian fishmeal.

"No special installation is required," Diez de Sollano said, "the plant is adapted to work off the ship's engine." Competitive foreign plants require installation of several additional motors, adding weight and complicating use.

Thirty of the plants have already been exported to Ecuador, and U.S. and Japanese fishermen have shown interest.

**So far, in Mexico,** six ships have been outfitted with the plants, and it is hoped that through official banks, especially the National Bank for Cooperative Development, captains of fishing boats, and firms owning fishing fleets, could install plants on all their craft.

Prices for units range from $11,200 for the one-ton model and $17,760 for the 5-ton to $31,360 for the 24-ton plant.

If all ships of more than 11 tons would install the plant, Mexico's fishmeal production would rise to 32,800 tons compared with the 7,100 tons produced in 1965 (latest year for which statistic are available).

Production could go much higher if smaller boats also installed plants. In shrimping operations several pounds of noncommercial fish are netted with each pound of shrimp. Until now, the fish have been wasted. But fishmeal plants can convert them into a useful product. *Emil Zubryn*