Biomedicine

New vaccine to quiet whooping cough

The vaccine that has curbed whooping cough in industrial nations since the turn of the century consists of crude extract from cooked, ground-up *Bordetella pertussis,* the bacteria that cause the illness. Though the vaccine is regarded as safe for most children (SN: 5/15/82, p. 330), its use triggered a medical crisis in England five years ago when a few healthy infants developed brain damage and seizures within days of vaccination. In an epidemic mirrored in several places around the world, some panicked parents refused to have their children immunized and, as a result, more than 100,000 children contracted whooping cough and at least 30 died.

Although physicians agree that the dangers of the disease far outweigh the risks of immunization, the quest for a safer vaccine has consumed several international research teams. A Japanese team reports possible success in the Jan. 21 LANCET: an alternative vaccine that seems just as potent as the traditional variety, but—at least in animal studies—is one-tenth as toxic.

Y. Sato and co-workers at Japan's National Institute of Health in Tokyo report "no detectable side effects" in the 5,000 Japanese toddlers given the vaccine since 1981. Among children in the study who were exposed to infection from a member of the household, pertussis developed in 48 out of 58 children not vaccinated, eight of 56 of those who had received the traditional vaccine, and four of 36 of those who were given the new vaccine.

The trick to creating an effective vaccine is to identify a substance that will provoke a mini-immune response in the patient without giving him or her the disease. But microbiologists have never agreed which components of *B. pertussis* are toxic, and which provide the desired immunity.

Sato and his group identified two components as important, though the mechanism of protection is still unconfirmed. "A long-term survey of the new vaccine with respect to its efficacy and side-effects, especially on the nervous system, will be necessary," they conclude, "although there has been no discouraging information in this respect so far."

A British follow-up study of 360 children who contracted whooping cough during the outbreaks of the late 1970s showed that the children seemed to suffer no long term lung damage from their illness. "We are confident in concluding that whooping cough is unlikely to be an important cause of subsequent chest disease in childhood," reported I.D.A. Johnston and colleagues of St. George's Hospital Medical School in London. Their study appeared in the Nov. 12 issue of LANCET.

High-tech immunity to protect calves

The first monoclonal antibody licensed by the U.S. Department of Agriculture for prevention of livestock disease came to market this month as a method of preventing devastating diarrhea in dairy cows. The protein is especially valuable in minimizing the spread of disease once an outbreak occurs, according to Lynn Enquist, research director for Molecular Genetics Inc., the Minnetonka, Minn., firm that developed the antibody.

More than one million calves die each year from "scours," a disease of cattle and hogs that is similar to human cholera. Most scours is caused by a noxious strain of *Escherichia coli* bacteria that clings to the wall of the host's intestine with miniature grappling hooks called "pilli," and pumps in a poison.

Vaccines currently are given to the mother shortly before delivery, with the hope that she will develop antibodies that can be transmitted through her milk to boost calf immunity in the critical first hours of nursing. Such vaccines are generally successful, says Enquist, but their efficacy hinges on the mother. In contrast, he says, his company's new product delivers "pure, high quality antibody" directly to the calf. Whether the antibody will be cost-effective in treating range cattle or hogs, Enquist says, remains to be seen.

Earth Sciences

In Buffalo, trying to bust the boom

Some residents of Buffalo, N.Y., decided to stop talking about the weather and to try to do something about it instead. One reason for the painfully cold Buffalo winters, they contend, is an ice boom that holds ice in Lake Erie, preventing it from flowing out into the Niagara River. The 2,700-meter-long boom was installed by the New York Power Authority and Ontario Hydro, operators of a massive hydroelectric plant on the Niagara River, after ice build-up in the winter of 1963-1964 caused lengthy power disruptions. The steel and timber boom floats near the head of the river. An ice arch forms behind it, preventing ice from moving downstream where it could curtail water flow, thereby reducing the amount of electricity generated. But is what's good for the power plant good for the city? The utility claims that the boom lowers power costs to consumers because it eliminates the need to generate more electricity at oil and gas burning plants, or to purchase power from outside vendors. But opponents of the boom say that it costs them money. Because ice remains in the lake until later in the year, they argue, spring in Buffalo is unseasonably cold. This in turn delays the beginning of the growing season and raises heating costs by prolonging the period of peak power demand.

The dispute has been raging for years. Finally the U.S.-Canada International Joint Commission, which oversees water issues involving both countries, laid the case before the U.S. National Research Council. The consensus? That Buffalo is cold, with or without the boom. In a recent report the council cited "overwhelming" evidence that Buffalo now really is colder than formerly, but that cannot be attributed to the boom. The number of days with freezing temperatures has increased since the late 1970s, but similar cool periods have been recorded before, and Buffalo is not alone among northern cities in feeling the chill. Cleveland is colder, and Toledo is too. In those cities no booms catch the blame for the same regional change in climate.

Springtime, the season for quakes?

To everything there is a season including, apparently, earthquakes. A geologist with the Earthquake Safety Organization, Inc., in Palo Alto, Calif., has studied the incidence of earthquakes with magnitudes 5.5 or greater that occurred along the northern segment of the San Andreas fault between 1855 and 1982. He finds that of the 40 earthquakes in that category, the 13 that happened in springtime took place during the 25 years preceding the great magnitude 8.25 San Francisco quake in 1906. The incidence of spring quakes far exceeds what could be expected if the quakes were distributed randomly throughout the year, writes Patrick H. McClellan in the Jan. 12 NATURE. He suggests that an increase in the spring timing of quakes in that region may be useful in identifying when stress is building up to another great event. The seasonality is unexpected and so far unexplained, he says. Based on the infrequent occurrence of spring quakes since 1906, McClellan concurs with the prevailing view that a repeat of the 1906 San Francisco quake is at least 25 years away.

Flying to the eye of polar storms

Weather researchers from the National Oceanic and Atmospheric Administration (NOAA) and other agencies are en route to the Arctic to study the severe storms that develop in winter at high latitudes. These low pressure systems may be akin to the summer hurricanes that form in lower latitudes, but they are smaller—rarely as wide as 200 miles in diameter—and develop more rapidly. Wind speeds may reach 100 miles per hour, resulting in high sea states that endanger ships in the area. The storms were only recently documented through satellite imagery. Melvyn Shapiro of NOAA in Boulder, Colo., says the storms may form as polar air as cold as -30°C moves over ocean water.