

Developing a vaccine

The Department of Health, Education and Welfare reports that for the first 10 weeks of 1971 the incidence of serum hepatitis is 32 percent higher than for the same period in 1970, and 142 percent higher than for the median reported during that same period over the last five years. This alarming increase is due to the transmittal of serum hepatitis by the infected needles and syringes of an increasing number of heroin addicts and by the greater use of blood transfusions in such operating room techniques as open-heart surgery. As many as 12 pints of whole blood may be used in one operation. The blood, often supplied by commercial agencies, may have been purchased from contaminated individuals.

With the discovery of the Australia antigen and its peculiar properties (SN: 6/13/70, p. 584), the possibility of screening blood plasma for the hepatitis virus became a reality. Various tests were developed that proved to be up to 75 percent accurate, but unfortunately they have not yet been standardized and are not available to all commercial plasma collection agencies. As of January 1971 New York is the only state that requires screening of all blood for the Australia antigen (SN: 12/19/70, p. 456).

Now it seems that there may be another solution to the problem. Scientists at the New York University Medical Center have succeeded in immunizing patients against serum hepatitis. They feel they have taken a significant step toward the development of a vaccine against the disease.

Dr. Saul Krugman, professor and chairman of the department of pediatrics at the NYU Medical Center, announced the findings this week at an honors program lecture at the NYU Medical Center. The report covers hepatitis work he has been conducting for the past 15 years with his co-workers, Dr. Joan P. Giles, research associate professor of pediatrics at the NYU School of Medicine, and Dr. Jack Hammond, director of the Willowbrook State School on Staten Island.

At a special unit of the Willowbrook State School, where hepatitis has always been common among the patient population, the researchers collected weekly serum samples from the infected patients. In recent tests this serum, containing the serum hepatitis strain of virus, was boiled for one minute to inactivate the virus and, with distilled water, used as a vaccine to inoculate children who had never had hepatitis. Then to test its effectiveness, these susceptible patients were exposed

to the infectious hepatitis serum by inoculation. None of the four patients who received two inoculations of the inactivated (boiled) serum contracted hepatitis, and all were able to produce antibodies against the disease. Four of ten of the patients who had received only one protective shot were also immune to the disease. Under normal conditions 96 to 100 percent of those inoculated with the infectious serum could have been expected to contract the disease.

Therefore, Dr. Krugman reports that active immunization against serum hepatitis has been achieved. The production of antibodies by the patients' own body cells was stimulated by the introduction into the body of the inactivated serum.

A procedure to develop passive immunity, protection by the introduction of antibodies formed in another individual, was also reported by Dr. Krugman. Hepatitis B Immune Gamma Globulin, supplied by Dr. Alfred M. Prince of the New York Blood Center (SN: 2/21/70, p. 200), was used to inoculate 10 individuals who had been exposed to the infectious serum four hours earlier. All 10 were able to develop immune protection against hepatitis. Five other individuals, also exposed to the infection, were inoculated with standard gamma globulin. Three of these five were not protected against the disease.

Serum hepatitis, a sometimes fatal disease, causes inflammation of the liver, fever and jaundice. In adults it is debilitating and may last as long as three months. In children, on the other hand, hepatitis is nondebilitating, extremely mild and of short duration. For these reasons the experiments were conducted only on children, and with parental consent.

The experiments were made possible by the development of sensitive tests for the detection of antigens and antibodies connected with serum hepatitis. Dr. Krugman says he and his co-workers will continue their work toward the prevention of serum hepatitis. At this time, however, because the experiments have been conducted on a relatively small number of individuals, the findings are not conclusive. In the future the team intends to extend the experiments to include a wider range of subjects. They will also conduct experiments designed to determine the length of time the immunizing serum is effective against hepatitis.

Dr. Krugman is confident that the further testing will enforce the present findings. But until then, he is reluctant to state definitely that a vaccine against serum hepatitis has been found. Instead he calls the inactivated serum used in the tests "a prototype for a vaccine." □

Lessons from the quake

The disastrous effects of the moderate San Fernando earthquake of Feb. 9 (SN: 2/20/71, p. 126) have raised serious questions about the lack of preparedness of a chronically earthquake-prone area. The question that haunts many is what will happen when the inevitable major shock comes?

Fortunately, the San Fernando quake also offered a unique opportunity to assess many scientific, engineering and human problems associated with earthquakes in a modern urban area. Accordingly, shortly after the quake the National Academy of Sciences and National Academy of Engineering appointed a joint panel to study and summarize its lessons.

This week the 12-man panel, headed by Dr. Clarence R. Allen of the California Institute of Technology, issued its report.

Disruptions of the ground surface by permanent deformations of rock and soil were much more important causes of structural failure during this earthquake than in any previous United States earthquake, the panel concluded. "This emphasizes once again the hazards associated with urbanization of active fault zones." On the other hand, geological knowledge of the area was apparently incomplete or erroneous. Many of the faults that broke during the quake were not generally shown on geologic maps and none had been considered particularly active.

Data from more than 200 accelerographs will form the basis for a reevaluation of earthquake-resistant building design. Though the earthquake's magnitude was only moderate, the severity of ground motion was close to the maximum generated by any earthquake—up to 75 percent of the earth's natural gravitational acceleration. One instrument in the epicentral region recorded the highest acceleration ever measured during an earthquake. Local ground motion is apparently not a simple function of the size of the shock. Present strong-motion accelerograph coverage is highly inadequate, the panel said. It should be expanded to include numerous structures and ground sites in all urban areas in seismic regions, as well as dams and nuclear power plants.

The earthquake provided the first real test of United States earthquake building codes. Modern structures designed according to the present building code performed well in regions of moderately strong ground shaking but were severely damaged in the region of very strong ground motion. If the duration of strong ground shaking had been appreciably longer than

NOAA charts a course



NOAA

Dr. White: Emphasis on environment.

10 seconds, as it would be in a great earthquake, some of these buildings would have collapsed completely.

Four hospitals in the region were damaged so severely that they were inoperative just when they were most needed. Certain critical structures—hospitals, schools and other high-occupancy buildings—“should be designed so that they will remain functional even after experiencing the most severe ground shaking.”

The near-failure of the Van Norman Dam endangered the lives of thousands. “Such risks are clearly unacceptable,” the panel said. A program for bringing older dams in earthquake-prone areas up to the best safety standards is imperative, it said. Many deaths resulted from the collapse of old buildings. There are thousands of such buildings in California. These, the panel said, should be either rendered safe or razed.

Serious disruption of transportation and some deaths resulted from collapse of bridges and freeway overpasses. Code requirements for such structures are termed “grossly inadequate.” Damage to the Sylmar Converter Station, a key link in a system for transmission of electric power into the Los Angeles area, will keep the system inoperable for about a year. For the crucial systems vital to millions of people—gas, electricity, water—design of individual components is not enough, in the panel’s view; sufficient redundancy should be built into the system to ensure against complete failure during an earthquake.

On the other hand, the panel noted, school buildings in the region of strong shaking that were constructed according to earthquake-resistant building codes did not suffer enough structural damage to have endangered students if school had been in session. This seems to demonstrate that one- and two-story school buildings can be made safe by practicable code requirements.

Other recommendations are to improve emergency services, make rapid reconnaissance studies immediately following an earthquake, study damaged urban dwellings to improve building guidelines, develop better earthquake insurance for houses and small businesses, bring about better seismic zoning, study the San Andreas Fault to see how the recent quake changed it and, in general, to make more detailed seismological studies.

“It is now clear that better preparation could have been made,” the panel concludes. It is certain that earthquakes of this size and larger will occur again. “What seems needed now is to learn from the San Fernando earthquake how best to prepare for and cope with the effects of future disasters of this kind.” □

Since passage of President Nixon’s Reorganization Plan Four, which established the National Oceanic and Atmospheric Administration (SN: 10/3/71, p. 283), and appointment of Dr. Robert M. White as its first Administrator, no formal statements have emanated from the organization about its directions for the future. Last week, shortly after having been sworn in by the Secretary of Commerce, Dr. White outlined some of his plans for the new agency.

NOAA’s prime target for the immediate future, Dr. White said, will be the environment. “It is no longer possible to relegate environmental concerns to the bottom of the pile; they must be on top.” Although a separate agency—the Environmental Protection Agency—is specifically concerned with the environment, Dr. White sees the roles of the two agencies as complementary. The EPA is a regulatory, standard-setting agency; NOAA is concerned with basic research. “The environment just happens to be uppermost in our minds.”

Specifically, NOAA will be concerned with determining atmospheric conditions that make for pollution, the effects of pollution on weather, and contaminants in fish. But it is not enough to know that certain ocean fish carry heavy metals in their systems, Dr. White said. “We must know how these contaminants enter and move through the marine ecosystem.”

But the approach will apparently be broader than problems of pollution and environmental deterioration, covering all aspects of the relationship between man and his environment.

Industrial activity in the coastal waters is already in excess of \$20 billion annually. The development and protection of ocean resources will be a major concern of NOAA. One new

program will be for Marine Resources Monitoring Assessment and Prediction. MARMAP will survey the kinds and quantities of living marine resources—such as ichthyoplankton, groundfish and pelagic fish—available to the people of the United States and provide data for their domestic and international management. Surveys of inshore, continental shelf and deep ocean regions for navigation and resource development will be increased.

One high-priority item, Dr. White said, will be establishment of a national environmental monitoring, warning and prediction system. The rapid weather wire service will be expanded. A network of VHF-FM stations now broadcasts continuous weather information to local areas, and the Weather Services radar network is almost complete. The new Improved TIROS Operational Satellite, launched late last year, will be equipped with infrared sensors to provide information on temperature, water vapor and other atmospheric variables all over the globe. Satellites have proved useful in hurricane and severe local storm prediction. The major problem yet to be solved is to find more rapid means of communicating the information they transmit. “The average lifetime of a tornado, for example, is ten minutes,” he points out. “With communication methods presently available to us, it is sometimes difficult to warn a significant segment of the populace before a tornado is gone.”

In addition, NOAA plans to launch, with the National Aeronautics and Space Administration, one Geostationary Operational Environmental Satellite in 1972 and another in 1973. Since “the weather is a force which consistently causes tragic loss of life and billions of dollars in property damage every year,” another area of emphasis will be weather modification, especially of hurricanes and other severe weather. “If we can one day exercise some degree of control over the weather, in addition to predicting it, the consequences to the American economy would be great indeed.”

In fisheries research, many new laboratories are understaffed. Dr. White says he will take steps to correct this situation and to “get our fisheries research fleet into the water.”

Though earth sciences are not contained in the agency’s name, there will be efforts in that field, as well. February’s earthquake in California for example, is being studied intensively.

Weather studies will be extended farther into the seas, with improved systems for prediction of tides and currents and ocean weather, including development of the National Data Buoy System. This, coupled with satellites, should provide information from hitherto unobserved areas. □