

Uncertainty at CERN

For the last seven years European physicists have wanted to build a particle accelerator roughly equal in energy to the United States project now under construction at Batavia, Ill. The two projects were born at about the same time and were expected to be completed more or less simultaneously. But every time the European project appears to have cleared one diplomatic barrier, another has emerged to plague it, and the United States project has by now far outpaced its European rival. The recent compromise on a site at Geneva (SN: 6/27, p. 615) seemed for awhile to clear the final hurdle. But it now appears that the optimism was premature.

The new plan proposes an accelerator that will be built first for operation at 150 GeV energy and be capable of later expansion to 300 GeV and even higher energies. The project would require an area only 1.8 kilometers in diameter and would cost only 900 million Swiss francs (\$207 million).

A ring of this size could be accommodated on land directly across the road from the present laboratory in a suburb of Geneva. The accelerator would be built in a tunnel through the rock under the site; the surface could be maintained in agricultural or some other use without disturbing the laboratory's experiments.

The new machine would be integrated with the present laboratory. The existing 30-GeV-proton synchrotron would be used part-time as an injector for the new machine. The CERN council thought this would settle the quarrel over location. A number of member states but, predictably, not all, have expressed a certain favor for the new plan. Among the nations still in doubt as the October meeting of the CERN council approaches, the most important are Great Britain, West Germany and Italy.

The British Labor Government said in 1968 that Britain definitely would not contribute to the European accelerator as it then stood. Since that time, not only has the CERN plan changed, but a new Conservative Government has been returned to power in London. According to the British delegation to CERN, previous refusal does not apply to the present plan. The British Science Research Council, which is responsible for the country's expenditure in high-energy physics, is unanimously in favor, and will advise the Government to go along with the plan. If the British do go along, the money for the new CERN project will come out of national expenditures for high-energy physics; in order to soften the adverse effects on British National Laboratories, the British would like to see the investment in the new machine

reduced slightly and the construction time extended one year.

The West German delegation is in favor of the new plan, but expressed doubts about concentrating European high-energy physics in one location.

Germany's participation would be more certain if the West German site were to be chosen. Nor do the Italians like the compromise plan. The proposals, they say, are being examined with "positive interest," but they expressed a preference for the previous proposal. They point out that a great deal of time, energy and money has been spent on studying the various site proposals. (An Italian site was among those in the final running under the old proposal.)

The Italians would like to see the two proposals compared and a decision

made on the basis of which is better for the future of European science. Of other national delegations, Austria, Belgium, Denmark, France, the Netherlands, Norway and Sweden, are on record in favor of the new project.

The French are in favor of the project but slightly disappointed that the new peak energy is not as high as would be possible on other sites. Switzerland is in favor of the new project and is willing to cooperate with the CERN organization and with the French Government to secure rights for the site which is on the boundary between the two countries.

The CERN council hopes that governments will have made their final favorable decisions on the project by December. If that schedule holds, physics at 150 GeV could begin in the new machine at the end of 1975. The American Batavia project has gone ahead faster than anticipated and its first beams of 500 GeV are now expected sometime in 1971. □

PERUVIAN DISASTER

Earthquake and avalanche



USGS

Avalanche traced a 9-mile path of destruction down the slopes of Huascarán.

Shortly after the May 31 Peru earthquake, the Peruvian Government requested United States assistance to help carry out a preliminary scientific study of the disaster. Two U.S. Geological Survey geologists have now returned from a study they made in response to the request. Their report is a tale of what they term almost unbelievable destruction, possibly surpassing in magnitude such catastrophic events as the Mt. Pelée eruption of 1902 and the eruption of Vesuvius that buried Pompeii in A.D. 79.

The vital statistics of the earthquake and its aftermath are enough to ensure it a prominent niche of notoriety in future histories of such events: Richter magnitude: 7.7 (initial shock); epicenter: 15.5 miles offshore from port city of Chimbote, 27 miles beneath the

surface; size of affected area: 25,000 square miles; estimated casualties: more than 50,000 dead or missing, 50,000 injured; property damage: 186,000 buildings—80 percent of houses in area—destroyed completely or rendered uninhabitable.

In lives lost, the earthquake was the most disastrous ever in Latin America, and perhaps in the entire Western Hemisphere.

The major geologic result of the earthquake was the massive debris avalanche from the glacier-covered 21,860-foot north peak of Huascarán, the highest mountain in Peru. It buried the towns of Yungay and Ranrahirca and killed more than 20,000 persons—about 40 percent of the total death toll.

The power of the avalanche was awesome. It began during the earthquake

with the sliding of a mass of glacial ice and rock about 3,000 feet wide and about a mile long. According to eyewitnesses, says Dr. George Ericksen, it moved downslope with a deafening noise and everywhere was accompanied or preceded by a strong turbulent air blast. Accounts by survivors suggest that it traveled the nine miles from its source to the vicinity of the cemetery at Yungay in two to four minutes. A velocity during the middle part of its course of 248 miles an hour is indicated by the trajectories of thousands of boulders weighing up to three tons that were hurled more than 2,000 feet across the Llanganuco valley.

The velocity and volume of the avalanche enabled it to ride over obstacles such as a 300-to-600-foot-high ridge between the Llanganuco valley and Yungay, where it obliterated all but a few thousand of the city's 19,000 inhabitants. Its momentum at the Rio Santa, nine miles from the source, carried it across the river and as much as 175 feet up the opposite bank where it partly destroyed a small village.

By the time the mass reached Yungay it is estimated to have contained about 80 million cubic feet of water, mud and rocks. "The ice was partly converted to water by heat and friction in the rapidly moving mass," says Dr. Ericksen. "A mud flow of such proportion, originating from an ice flow, indicates a geologic process never before recorded."

The avalanche's high velocity was due primarily to the combination of steep slopes (as much as 70 degrees) in the source area and the great vertical relief (nearly 12,000 feet) along its nine-mile path to the Rio Santa. Frictional resistance may have been significantly reduced by the lubricating effect of the snow-and-ice mixture.

In the Alaska earthquake of 1964, the most thoroughly studied quake in history, an avalanche of at least 13 million cubic yards of rock and ice that rushed across Sherman Glacier showed indications that much of the motion took place over a thin cushion of compressed air trapped between the avalanche material and the glacier surface. This same effect seems to have occurred in local areas of the Peru avalanche, Dr. Ericksen says. Air-cushioned flow near the source is suggested by the undisturbed condition of ridges of loose moraine material that the avalanche apparently moved across.

An even greater contributor to death and destruction than the debris avalanche was the collapse of buildings in response to seismic shaking. An estimated 30,000 people were killed as a result of building collapse. The destruction was largely due to the poor construction of the buildings. Chiefly built of adobe, they had little shear resistance to the lateral forces created by earth-

quake shock. Brick buildings without a reinforced concrete framework offered only a little more resistance to earthquake shock than did the adobe buildings, although they rarely were totally collapsed. Poorly compacted soil beneath many of the villages compounded the structural stability problem.

The third major cause of destruction, according to the report of a separate preliminary field investigation by Dr. S. T. Algermissen of the U.S. Environmental Science Services Administration, was a wave of water as much as 45 feet high that rushed downstream through the narrow canyon of the Rio Santa after the avalanche. □

DRUG REGULATIONS

FDA back to court

The Food and Drug Administration has been beset by criticism that it is not acting swiftly or efficiently to remove from the market drugs judged ineffective by a review panel of the National Academy of Sciences-National Research Council.

The FDA explains that a series of legal battles over its efforts to ban all combination antibiotics tied its hands, but that the courtroom fights have been won and the agency will begin to move (SN: 7/4, p. 9). Now, a new suit, filed July 23 by the Pharmaceutical Manufacturers Association on behalf of its 120 member companies, may tie FDA's hands again.

The suit contests regulations set forth by the FDA on May 8. The regulations define what FDA means when it says "adequate and well-controlled studies" in man must stand behind manufacturers' claims that a drug is effective. In essence, the FDA demands clinical trials involving carefully selected patient and control groups. The fact that a compound has been around a long time and is popular with physicians does not constitute reliable evidence of efficacy, according to FDA ground rules. Much of the support for combination antibiotics falls into the latter category.

Once before the PMA challenged the FDA's definition of what constitutes proof of efficacy, a definition originally promulgated Sept. 19, 1969. In that suit, PMA won an injunction against FDA on the technical grounds that affected parties had no time to comment on the regulation before it went into effect. This time around, PMA is aiming at the substance, not the technical niceties, of the issue. In addition to asking the United States District Court at Wilmington, Del., to declare the May 8 regulations void, PMA is challenging the right of the FDA commissioner to decide unilaterally whether a drug company is entitled to a public hearing in disputes over drugs slated to be banned as ineffective. □

PREGNANCY STUDY

Weight and toxemia

Most physicians warn patients to gain no more than 10 to 14 pounds during pregnancy. The classic reason is the presumption that the more weight a pregnant woman gains, the more likely she is to develop toxemia, a metabolic disorder marked by swelling and high blood pressure.

This conventional wisdom, according to a panel of scientists from the National Academy of Sciences-National Research Council, is ill-founded. In fact, they say in a report on Maternal Nutrition and the Course of Pregnancy, it may be actually dangerous, contributing to the high rate of infant mortality in the United States. Among 40 countries, the United States ranks thirteenth in infant mortality, according to 1966 figures. Urging that the 14-pound limit be raised, the panel, headed by Dr. Robert E. Shank of Washington University School of Medicine in St. Louis, declares that pregnant women should gain between 20 and 25 pounds to insure healthy growth and development of their babies.

The theory that weight gain directly influenced the onset of toxemia was advanced during World War I from observations that women on restricted diets had a low incidence of toxemia and few complications of pregnancy and delivery, generally because they had smaller babies. However, says Dr. Shank, "time has not proved this to be true." Small babies may be less subject to risk of trauma during delivery but they are not necessarily healthier. Indeed, correlations have been noted between low birth weight and infant mortality. In addition, studies of animals during gestation have revealed parallels between the adequacy of maternal nutrition and normal cellular growth of fetal organs. Poor nutrition fosters delayed or limited growth.

At the same time, studies have revealed no direct correlation between weight gain and toxemia, the cause of which is unknown. According to Dr. Shank, one of the difficulties in pinning down the cause and fundamental biochemical nature of toxemia is that there is no good animal model for studying the disease process.

Deaths from toxemia, the study reveals, are higher in poorer sections of the United States, rising far above the national average of 6.2 per 100,000 pregnant women. In Mississippi, the toxemia death rate is 30.2; in South Carolina, 21.0. These two states have the lowest per capita income in the nation. In general, a high incidence of infectious disease, poor medical care and inadequate diet, both during pregnancy itself and during the entire life of women from low-income families