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 undisrupted condition of ridges of loose morainal 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 earthquake 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