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

combine to increase the likelihood of toxemia regardless of any weight gain or loss.

The NAS-NRC panel also questions the common practice of restricting salt intake and prescribing diuretics to reduce fluid retention.

Pregnant women generally have increased levels of body fluids; Dr. Shank observes that this is due in part to a substantial rise in blood volume, and with it, fluid volume. Mild edema, or fluid retention, manifest by swollen ankles, for example, is a common but not serious effect of pregnancy. It appears to be unrelated to the basic disease process of toxemia.

Experiments with rats indicate that pregnant animals need reasonably substantial levels of salt. The same may be true of women. Diruetics, they report, should not be given routinely but only when there is clinical evidence that they are needed.

Taking still another swing at traditional medical practice, the NAS-NRC investigators declare routine use of vitamin and mineral supplements "of doubtful value," excepting only iron and folic acid. They recommend an iron supplement of 30 to 60 milligrams a day and a daily dose of 200 to 400 micrograms of folic acid. □

QUARK THEORY

Trouble from N*

The predictions of the quark theory of elementary particles have proven quite accurate, but more sophisticated experiments are causing trouble. Experimenters are finding now and then that what they previously thought was one particle is really two. "The more resolution we have," says Dr. Kwan Wu Lai of Brookhaven National Laboratory, "the more complicated the picture becomes."

The most celebrated of such split particles up to now is the A_2 meson (SN: 11/1, p. 410), which raises serious doubts about the adequacy of the present quark theory to explain it. Now a Brookhaven experiment confirms the existence of another split, in this case the N* meson. The experiment was done by Dr. Lai and Drs. David H. Crennell, James Louie, J. Michael Scarr and W. H. Sims. The experiment confirms, they say, that a meson of 1,730-million-electron-volt mass, which they call the N* (1730), exists and is a different particle from the previously known N* (1680) of 1,680-million-electron-volt mass. They don't yet know enough about the spin and parity properties of the new N*, says Dr. Lai, to determine whether the splitting of the N* presents the same sort of problems to the theorists as does the splitting of the A_2. □

SCIENCE NEWSBRIEFS

Yellow light for saccharin

At the request of the Food and Drug Administration, the National Academy of Sciences-National Research Council convened an eight-man panel to investigate the safety of saccharin, the artificial sweetener used in combination with cyclamates until the latter were banned as a hazard (SN: 10/25, p. 369). For the present at least, saccharin will not go the route of its former companion. On the basis of available data, the NAS-NRC panel ruled that normal use of saccharin "does not pose a hazard." At the same time, they pointed out that available data are incomplete and called for further research. □

Lunar quakes

For years lunar scientists have disputed whether the moon's interior is hot or cold. Now from the seismometer left on the moon by Apollo 12 astronauts last November at the Ocean of Storms, evidence seems to be reinforcing the hot-moon theory.

According to Dr. Gary Latham of Columbia University's Lamont-Doherty Geological Observatory, seismic signals recorded at the site show that moon quakes are occurring each lunar month, at the time of perigee, when the moon is closest to the earth.

The quakes are apparently triggered by the tidal strain and Dr. Latham seems certain that these are produced by activity within the moon, probably a mile beneath the surface, and indicate a hot interior.

The seismometer transmitted 160 signals during seven months. Of these 14 were indications of lunar quakes, according to Dr. Latham. The others were probably caused by meteoroid impact. □

Mercury polluters

When the Federal Water Pollution Control Administration last month proclaimed mercury pollution to be a widespread problem in the United States it said it was initially asking industries voluntarily to stop discharging mercury into waters (SN: 7/11, p. 34).

They failed to comply fast enough to suit Secretary of the Interior Walter J. Hickel. Hickel announced last week that the Justice Department will file charges against 10 United States industrial plants for "discharging sufficient quantities of mercury into the nation's waterways to constitute a serious hazard to public health.

"This is just the start," Hickel said in releasing the names of the companies, which included Allied Chemical, Olin Mathieson and Georgia-Pacific Corp. "We are developing hard evidence against a number of other companies." □

Genetics study

To date, some 2,000 diseases are recognized as being either caused by genetic disorders or having a genetic component.

The House of Representatives has adopted a proposal for establishing a national task force in genetics. The bill, allocating $10 million to back a panel of scientists, including representatives of the National Institutes of Health, now goes before the Senate.

The suggestion for a task force in genetics came from the National Cystic Fibrosis Research Foundation in New York. Cystic fibrosis, one of the most common of genetic diseases, affects one of every 1,000 newborns, and one person in 20 is believed to carry the gene for the disease. □

Drug bill

The House Subcommittee on Public Health last week recommended legislation limiting the Justice Department's authority to regulate drug research (SN: 7/25, p. 62) and to classify drugs as subject to abuse. Much of the power would be assigned to the Department of Health, Education and Welfare.

Justice opposes any restriction of its power to classify drugs, favoring a Senate-passed version making HEW simply an adviser to Justice on drug classification.

Another House bill, reflecting Justice's preference, was reported this week by the House Ways and Means Committee. Considerable horse-trading will take place before a final House version of the controversial Drug Abuse Control Law emerges. Then further compromise will be required with the Senate, if any drug abuse control legislation is to emerge from Congress this year. □

Oral diabetic drugs

Scientists from 12 universities in the United States spent the last eight years studying oral antidiabetes drugs taken daily by close to a million persons with mild diabetes (SN: 6/20, p. 596). They concluded that these drugs offer no benefits but pose a risk of cardiovascular disease. The Food and Drug Administration has ordered drug manufacturers to rewrite the labels on these compounds, reporting the university group view.

The Canadian Government finds the United States action premature. Calling the study "inconclusive," and "far from satisfactory," Dr. Jeffrey Bishop of the Canadian Food and Drug Directorate says that the FDD plans no action similar to the FDA's. In fact, the FDD advises patients to continue taking oral antidiabetes compounds. □