

The Managua quake: The inevitable happens

Four years ago, the city of Managua, Nicaragua, was hit by a moderate but destructive earthquake. Though it registered only 4.6 on the Richter scale, it caused considerable damage. Scientists with the U.S. Geological Survey who went to Managua to study the quake and its aftereffects found that Managua was built on geologically unstable ground in a volcanically active region—a dangerous combination. In a subsequent report, USGS scientist Robert Brown predicted that a larger and more destructive earthquake could be expected.

As the world now knows, during the first night of what became a tragic Christmas weekend in Nicaragua, it happened. The city was shaken by a series of tremors. The largest had a Richter magnitude of 6.25. This was not an exceptionally severe shock, but it destroyed an estimated 70 percent of the city and left thousands dead.

Relatively few earthquakes have hit modern cities, so the Managua quake offers a valuable opportunity to study the causes and effects of quakes. Earthquake researchers from several U.S. agencies are already at work to learn just what happened and why the Managua earthquake had such disastrous effect. A team from the National Oceanic and Atmospheric Administration left Monday for Managua and will probably be joined by two scientists from the National Bureau of Standards. The USGS is also preparing to send a team to investigate the quake.

Some of the causes of the disaster are already known, or can be guessed. Managua is in a volcanically active area. The Negro, a volcano near Managua, has erupted violently in the recent past. Furthermore, Brown points out, the city is built on loosely compacted volcanic debris that was deposited very recently in geological terms—over the past 2,000 years. Brown says the recent Managua earthquake was probably caused by volcanic activity, rather than by the kind of fault motions responsible for most California earthquakes. Volcanism tends to produce quakes with a very shallow focus, which cause more severe shaking over a smaller area than would a deeper earthquake. This shallow, severe shaking would cause the loose volcanic soil under Managua to give way, sliding downhill toward nearby Lake Managua.

When recurring natural disasters periodically destroy human habitations, there seems little else to do except rebuild in a safer location. The Alaskan city of Valdez was relocated elsewhere after the 1964 quake destroyed it. Now Nicaraguan leaders are talking of rebuilding the city of Managua in a less quake-prone area.

workers appear to be uniquely privileged observers: No one else who has looked has seen the waves. The situation is intolerable and must be resolved one way or the other.

A rather open end at the moment is occupied by the black holes, bodies that have collapsed until their gravitational fields are so strong that nothing can escape. For 50 years black holes were a theorist's curiosity, and many believed they could not exist. Now astrophysicists are looking for them and some believe they have seen them. There is a logical absurdity in looking for something that by definition cannot be seen. It is gotten around by trying to observe a black hole's effect on nearby bodies.

It is clear that as time goes on the more and more intimate wedding of theory and observation will continue for all the topics now known. Whether or not observation will discover some entirely new phenomenon that will give theorists the chance to start all over again with sweeping sketches like those of yesteryear remains to be seen. □

EPA: Aldrin, dieldrin given partial reprieve

Though DDT has received the most attention, and seems to be the most insidious of the pesticides, others have also fallen under scientific and public suspicion. Two, aldrin and dieldrin, have been found to have possible adverse effects on reproduction and have been detected in chicken eggs and milk. As a result, their use has declined.

The Environmental Protection Agency, in fact, has been considering suspending all use of aldrin and dieldrin. Now, in the wake of a decision by industry to voluntarily withdraw the pesticides from some of their more controversial uses, the agency has announced that it will permit continued use of aldrin and dieldrin for certain uses pending a public hearing scheduled to begin in April. The permissible purposes include soil treatment for corn and citrus fruit, orchard trunk spraying, foliage application on certain fruits and vegetables and termite control. □

How a person reacts to a drug: Prediction 'unlikely'

Physicians have long known that patients vary markedly in their responses to drugs. The physician can attempt to counter the problem by giving a small amount of a drug at first to see how a patient reacts, then increasing the drug to the desired dosage. But the approach is far from ideal, especially when a patient is on an anticoagulant or diabetic drug, critically ill or about to undergo surgery. So pharmacologists, especially in the United States, England and Sweden, have been at work for a decade or so to better understand and anticipate drug responses.

A year-and-a-half ago, pharmacologists knew that if patients were given the same drug, they would respond differently because their blood and liver enzymes metabolized the drug differently. These enzymes appear to have different structures in different people and to be under genetic control (SN: 6/25/71, p. 438). So Stephen Smith, a pharmacologist at St. Thomas' Hospital Medical School in London decided to see whether the way a person metabolizes one drug is indicative of the way he metabolizes another. Smith and his colleagues gave several drugs to healthy volunteers. They found not only that each subject metabolized a given test drug differently but also that each subject metabolized each test drug differently than he did the other drugs. "So it is unlikely that we will be able to develop predictive tests," Smith told SCIENCE NEWS in an interview in his London laboratory. "To know how a patient handles a drug you have to measure that drug. Yet there are many drugs that cannot be easily assayed, or assayed at all."

But why is it, if each person has unique drug-metabolizing enzymes, that a test with a model drug does not indicate how he will metabolize other drugs? One reason, it appears, is that drug-metabolizing enzymes are more specific in their actions on certain drugs than pharmacologists suspected. In other words, enzymes that are activated in breaking down a drug may not be activated in breaking down another drug. Another explanation, bolstered by another of Smith's experiments, is that nervous tissue as well as drug-metabolizing enzymes affect drug metabolism, and these nerve reactions are also highly individualistic.

Smith, in collaboration with pharmacologists at the University of Lund in Sweden, gave identical twins and fraternal twins an eye dilating drug and an antispasmodic drug, then measured the response of their eye nervous tissue and heart nervous tissue to these drugs.



Joan Arehart-Treichel

Smith: Nerves respond to drugs.

They found that nervous tissue responses to the drugs varied considerably among the fraternal twins, but not among the identical twins. "So it begins to look," Smith says, "as if inherited characteristics are important in two ways to drug metabolism. They determine how quickly you break down a drug, and at the same time may also determine how your tissues respond to the drug."

Elliot Vesell of Pennsylvania College of Medicine and a long-time investigator into varying drug responses agrees with him. "There are probably a lot of genetic effects going on at the level of the interactions of drugs and nerve receptor sites," Vesell says. "We don't know about these, and we have not been able to test them. So they remain a sort of black box or mystery at present."

But there are some clues to how nerves might interact with drugs. One is the sense of taste, a nerve response. Taste sensitivity has been correlated with drug sensitivity. Taste sensitivity to the drug quinine, for example, can be 10,000 times more acute in one person than another.

Smith has preliminary evidence that taste sensitivity to drugs is genetically determined, just as responses of enzymes, heart tissue and eye tissue to drugs are genetically determined. Might taste-drug tests predict how a person's tissues might respond to a drug? "Maybe," Smith says, "but it's more likely such tests will give us better understanding of how a drug works."

All these efforts, pharmacologists believe, should lead to better drug treatment. Says Smith: "We have left the days where you give a drug and hope it will have the right effect." □

Portrait of a teenage suicide

Youth is not usually considered a time of despair, but surprisingly, teenage suicides have nearly doubled in Los Angeles County during the past year. Joseph D. Teicher, director of Child-Adolescent Psychiatric Services at the Los Angeles County-University of Southern California Medical Center, says the adolescent who attempts suicide concludes that it is the only solution after all other attempts to cope with his problems have failed. Problems with parents, poverty, peers, broken romance and pregnancy, explains Teicher, are usually involved in teenage suicide.

Teicher's studies reveal that the five years preceding the suicide attempt are marked by personal, medical, social and family difficulties. The most prevalent among the problems, however, involves the loss of important relationships early in life, leaving the youth alone in attempts to cope with the stresses and anxieties of growing up. In 72 percent of the attempts studied, one or both natural parents were absent from the home due to divorce, separation or death. Of those living with step-parents, 84 percent felt they were contending with an unwanted stepparent. In most of these cases, family

conflicts were viewed as extreme.

Other factors preceding suicide attempts were changing schools, siblings leaving home and financial difficulties. Fifty percent of the suicide attempters' families had a net annual income of \$3,600 or less. Half of these had a net income of \$2,700 or less.

These circumstances, along with the normal problems of adolescence, overwhelm the suicidal youth, says Teicher. Moodiness, despair and rebelliousness further alienate the youth from those who might offer help. The need for a close relationship becomes intense and, in many cases, teenage romance offers this possibility. When the romance fails, the adolescent is often left with no friends, and the pregnancy that may result from the relationship further alienates the young woman from school, friends and family.

Treatment must be not only with the young person, Teicher emphasizes, but with the parents, the schools and community. "It behooves all of us," he says, "who are engaged in dealing with the young to be aware of critical events in the life pattern of the adolescent, and to be alert to the onset of finalized despair which leads to the tragedy of suicide." □

'Serious shortcomings' in classroom laser safety

Exposure to a laser beam, even from a low-powered laser, can damage human tissues in many ways, and can even cause blindness. So far, although several Government and industry groups have been working on safety standards for manufacture and use of lasers, a body of national, enforceable standards has not been adopted (SN: 2/5/72, p. 94). Few serious injuries have been reported to date, but that, according to a new survey by the Food and Drug Administration, can be attributed to nothing but dumb luck.

In cooperation with state health agencies FDA's bureau of radiological health conducted a seven-state survey of laser use in high-school and college science classes. A total of 288 lasers were surveyed in Colorado, Florida, Illinois, Montana, Oklahoma, Pennsylvania and Washington. The survey results, released this week, reveal what FDA calls "serious shortcomings" in classroom safety practices.

In many cases laser beams were directed toward students or areas through which students might pass. A few instructors even exposed students to laser beams deliberately. Lasers were often used in locations where the beam might bounce off a reflecting surface and strike a student. Seventy-two percent of the lasers were operated without

displaying signs to warn passersby.

Though most lasers used in classrooms are low powered, a laser with a power output of as little as two milliwatts has been reported to have produced a burn on the human eye. Two milliwatts is well within the range of most of the lasers surveyed.

The FDA is developing laser safety performance standards for newly manufactured equipment. The proposed standards will be published within the next few months. They would not apply to lasers already in use. The FDA has no jurisdiction over lasers now being used in schools and colleges, but state health officials and local school boards do. FDA has sent preliminary survey results and a list of recommended safety practices to radiation control agencies in all 50 states, the District of Columbia, Puerto Rico and the Virgin Islands. Among the recommended precautions: (1) Avoid direct laser viewing; (2) Remove objects with reflective surfaces from laser beam paths; (3) Block the beam when it is not needed; (4) Prepare and test laser demonstrations beforehand when students are not present; (5) Use key-locked switches to prevent use of lasers by unauthorized persons; and, (6) Don't leave operable lasers accessible and unattended. □