Scientist-astronaut Schmitt at a huge, split lunar boulder during third EVA.

released, geologists jubilant

we wouldn't have much left to discover. How wrong I was." He said each mission added more and more to the science coffer.

Cernan and his traveling partners Ronald Evans and Harrison Schmitt went almost immediately into the extensive post-flight debriefings and medical examinations upon their arrival in Houston Dec. 21. (Cernan lost nine pounds and Schmitt, four and one-half pounds. Evans, called the galloping gourmet of the flight, gained one and one-half pounds.) They continued debriefing through Christmas Eve and will resume Jan. 2.

Lunar scientists were also exuberant in their appraisal of Apollo 17. They were particularly excited when the astronauts' color photographs, processed last week, revealed that the orange soil (SN: 12/23/72, p. 404) did indeed appear orange—even in the pictures. This increases the possibility that the material is the product of very young lunar volcanism. Scientists are making plans to do a thorough analysis of the gases that come out of the soil. The two large sample-return containers, five sample bags full of smaller bags, and another larger bag of material were placed in the nitrogen processing lines at the Lunar Receiving Laboratory. Several rocks were placed in the radiation counting laboratory at MSC, but because of the Christmas holidays the first rock box was not to be opened until later this week. □

Final Apollo's homeward view: From the Mediterranean (top) to Antarctica.

Observing and pondering astrophysics' puzzles

Relativistic astrophysics is a phrase with a certain ambiguity. It can refer to the theory of special relativity and thereby to dynamic and electromagnetic processes at speeds near that of light. Or it can refer to general relativity, the Einsteinian theory of gravity, which is especially applicable to cases where gravitational fields are very strong.

Relativistic astrophysics takes under its purview most of the astronomical discoveries of the last decade or so, and most of them seem to fit the definition in both senses. In pulsars, for example, there are, according to current belief, both electrically charged particles moving at speeds near that of light and very strong gravitational fields.

As the Sixth Texas Symposium on Relativistic Astrophysics opened in New York last week, Engelbert Schucking of the University of Texas at Austin remarked that the conferences were getting more and more scientific. By this he meant the theory of relativistic astrophysics is becoming more and more tied to observations.

It is not merely that objects that were once exercises for theoretical imagination are becoming actual: Pulsars have been known for several years, and the early theoretical speculation that they are neutron stars is now widely accepted. A few years back pulsars had not been as fully observed as they have been now. Theoreticians could let their minds play with the general principle. Now they must strain to accommodate theory to minute fluctuations in the periods of pulsars, as determined from four years' close watching, and as a result one hears refinements of neutron-star theory that its originators never dealt with: solid crusts, solid cores, liquids and gases of very strange appearance.

There is both frustration and tedium in these attempts to fit theory very closely to observation, but it would be wrong to say that the scientists feel stymied. Rather there is a sense of eagerness to see where observation and theory will lead. There is plently of unfinished business in both categories. A theoretical example is the quasars. A decade of observation has led to no agreement as to what they are or where they are, whether local or at cosmological distances. Theorists continue to speculate while observers observe.

A very big example of an observational loose end is the gravity waves. Predicted by Einstein's general relativity, their discovery is claimed by Joseph Weber of the University of Maryland. So far, Weber and his co-

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.