mechanisms at work during polarization to be studied more easily. Second, they knew that the algae eggs drive an electrical current of charged particles through themselves, and suspected that this might have something to do with the polarization. And third, they wondered whether a current of calcium ions might be involved since these can bind strongly to cell components and produce an electrical field inside the cell.

To test whether calcium ions were involved in the egg's electrical current during polarization, they rigged up a system of chambers and nickel screens with tiny holes. They plugged thousands of holes with fertilized *Pelvetia* eggs and passed radioactively labeled calcium ions into the system. *Pelvetia* eggs have the characteristic of polarizing themselves when exposed to light so that the illuminated side becomes the leafy part of the plant and the unilluminated side becomes the root. The team was therefore able to predetermine the sides and measure the flow of ions from the future root end to the future leafy end. The diagram shows the orientations after the eggs have begun to grow: The light shines on the rounded portions, the future leaves, and the pointed root ends are shaded.

The team found that six hours after fertilization, five times more calcium entered the future root end of the egg and three times more left the future leafy end of the eggs. This establishes that there is a flow of charged calcium particles across the polarizing egg. Whether or not this electric current is responsible for the laying down of the pattern is still unproven, but the team has a hypothesis. For the egg to polarize, there must be movement, Robinson says. "Since initially all parts of the cell appear the same, one way to become differentiated is for the 'stuff' inside the cell to move to one end." One possible force for moving the components of the cell, such as vesicles and large molecules, would be a moving field of current that would interact with the charge on the cell components. "The electric field would then cause the various charged entities in the cell to move toward one end," Robinson says.

An interesting project, Robinson says, would be to test already polarized eggs such as sea urchin eggs. These show an influx of calcium ions after fertilization (SN: 11/23/74, p. 327), but the ions' role in differentiation is unknown.

In other work not yet published, Robinson, Jaffe and R. Nuccitelli found currents of sodium and chlorine ions moving across algae egg cells. The next step in their research will be to find out if the electric currents of calcium, sodium and chlorine particles are responsible for the polarization, Robinson says. That work, however, is still in the "thinking and talking stage." □

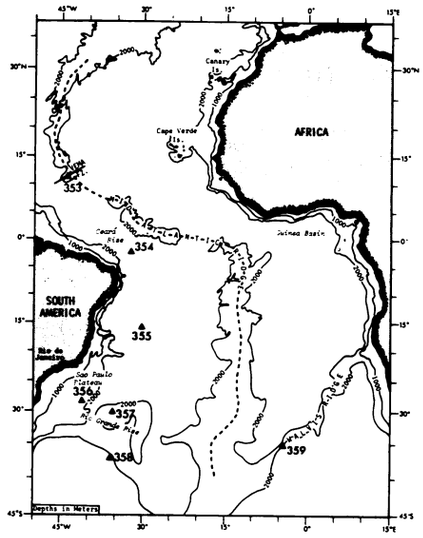
The mighty Amazon reveals her age

The ocean-wide ramblings of the deep-drilling ship Glomar Challenger seem hardly related to the steaming jungles of the Amazon River. Yet on the most recent leg of its years-long research odyssey, Challenger scientists have been able to discover the apparent time of the mighty river's birth—some 24 million years ago.

The mission of the Deep Sea Drilling Project's Leg 39 was to sample sediments from seven sites in the South Atlantic, seeking clues to its age and evolution. The second stop was the Ceara Rise, an undersea plateau about 300 miles northeast of Brazil's eastern tip. The upper levels of the core samples from the rise, dating back as far as the early Miocene Age about 24 million years ago, yielded traces of minerals and other land-derived materials similar to those carried into the Atlantic by the Amazon River today. The lower—and older—sediments, however, showed only the fossilized remains of microscopic creatures which lived and died in the ocean, with no signs of the river's contributions.

This corresponds approximately to the time when some researchers believe the Andes Mountains were formed, which leads to the possibility that the upthrusting of the Andes caused the general water drainage of South America to flow eastward, gradually accumulating into what is now the Amazon.

The seven Leg 39 sites also produced the beginnings of a history of the South Atlantic, most notably by revealing three periods, each millions of years long, when the depositing of sediments seems virtually to have stopped. About 65 million, 40 million and 12 million years ago, Leg 39



Aging the Amazon from DSDP site 354.

scientists theorize, drastic changes took place in the oceanic environment. One candidate, for example, is major shifts in deep current patterns such as that caused by the splitting of Australia from Antarctica about 50 million years ago. This particular schism led to the formation of the present West Wind Drift Current circling Antarctica, which would have affected the bottom currents of every major ocean and possibly led to the missing sediments of 40 million years ago.

The Leg 39 researchers, led by Katharina Perch-Nielsen of the Geologic Institute of Zurich, Switzerland, and DSDP chief scientific editor Peter Supko, will be further investigating such possibilities with data to be gathered from the southeastern South Atlantic over the next two months. □

A virus that switches off cancer

Viruses have been implicated long and heavily as cancer-causing agents in animals. So it comes as somewhat of a surprise that there is a cancer virus that is self-limiting. Even more intriguing, this virus increases the spontaneous regression of cancer caused by a related virus.

The virus and its actions have been discovered by Philip Furmanski, James Baldwin, Rodney Clymer and Marvin A. Rich of the Michigan Cancer Foundation in Detroit. They report their findings in the Jan. 10 SCIENCE.

A virus called the Friend virus is known to cause leukemia of the spleen in experimental animals. This leukemia almost inevitably leads to the rupture of the spleen and death. Rich isolated and characterized a virus that induces leukemia that is virtually indistinguishable from that induced by a Friend virus. But the leukemia caused by this virus eventually regresses, and the synthesis of the virus that accompanies the cancer also subsides. This singular virus prompted Rich and his colleagues to look into its action in greater detail.

They prepared ample quantities of the regressive Friend virus, as they call it. Then they inoculated groups of 10 mice each with 42 different doses of conventional Friend virus, regressive Friend virus or of a combination of the two.

The virus doses induced leukemia in most, but not all, instances. Among those instances where the viruses induced leukemia, spontaneous regression occurred in only two percent of

the mice whose leukemia had been caused by the conventional virus. Regression was 56 percent among the mice whose leukemia had been caused by the regressive virus and 20 percent among the mice whose leukemia had been caused by both viruses. So it appeared that if the conventional virus was inoculated with the regressive virus, it resulted in a significant incidence of spontaneous leukemia regression.

Since submitting their report to SCIENCE, the investigators have identified the component of the regressive virus that is responsible for the regression. They have also found that antibodies in the mice with regressing cancer react against the protein coat of the virus and to some extent against the leukemic cells infected with the virus. How this new information might help explain cancer regression remains to be seen.

Meanwhile, Furmanski told SCIENCE NEWS, they plan to use mice infected with the regressive virus to explore ways of prolonging remission in human leukemia patients. For instance, they may give immunotherapy to the mice to see whether it improves their immunity against the regressive virus and hence brings about regression for an even longer period than usual. □

A 2nd space monitor of dynamic earth

"If it doesn't have astronauts on it, nobody gives a damn," says a frustrated public affairs officer at the National Aeronautics and Space Administration, bewailing the lack of public interest in most of its unmanned satellites. The Earth Resources Technology Satellite, however, has been a different story. Launched July 23, 1972, and already 150 percent past its predicted one-year lifetime, it has monitored such an incredible range of floods, crops, earthquakes, oil slicks, mineral deposits and other subjects (SN: 3/31/73, p. 214) that for hundreds of users it has become virtually a resource in itself.

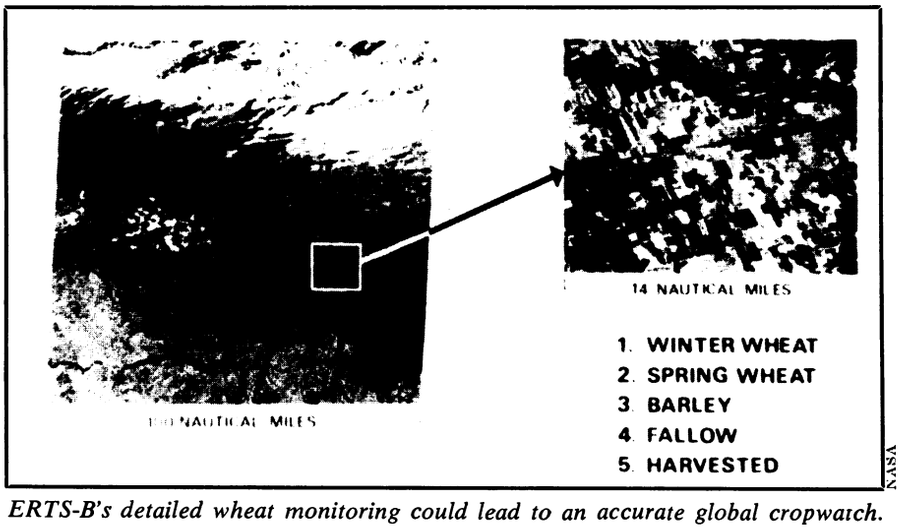
So important is the continuity of its data in the eyes of NASA, Congress and legions of scientists and Federal, state and local officials that a second satellite, ERTS-B, was moved ahead a full year from its original 1976 launch date to its imminent take-off on Jan. 19. There are even plans for a third ERTS, conceived in the early months of the first one when it was already on its way to exceeding its planners' wildest dreams and now sweating out the question of Administration backing in the NASA budget request due late this month. "If I had to pick one spacecraft, one Space Age development, to save the world," says NASA Administrator James Fletcher, "I would pick ERTS and the satellites which I believe will be evolved from it later in this decade."

Besides providing data for a host of new studies, ERTS-B will be contributing to a huge group of 109 research teams in more than 40 states and as many foreign countries concerned specifically with continuing projects begun by ERTS-1. Covering farming, forestry, land-use surveys, mapping, geological studies, meteorology and various mineral, marine and other resources, they will range from tracking sorghum diseases in Illinois to monitoring changes in the central Niger River delta in Mali.

As investigators have worked their way through ERTS-1's more than 100,000 images of the earth, many of which are overlapping photos taken at different wavelengths of light to reveal different characteristics, their goals have become more specific and demanding (SN: 8/10/74, p. 88). It is difficult, after all, says one university hydrologist, to imagine taking advantage of a 10 percent boost in the accuracy of watershed forecasts. "It seems like such a small increase," he says, "until it's there and you really find out you can count on it."

In addition to the narrow-gauge projects, however, ERTS-B will be turned to several really broad efforts, in hopes that it can help treat some of the national and global resource ailments that now afflict the planet. One of the major ones is the Large Area Crop Inventory Experiment (LACIE), to be run jointly with the Department of Agriculture and the National Oceanic and Atmospheric Administration. Touted at the World Food Conference in Rome by Secretary of State Henry Kissinger as "a promising and potentially vital contribution to rational planning of global production," LACIE will combine ERTS photos showing crop acreage with meteorological data from ground stations and other satellites in hopes of enabling the first truly accurate large-scale crop forecasts. The first year will be confined to wheat in North America, with other crops and countries to follow if it works. The availability of such information could affect activities ranging from local irrigation planning to multinational foreign aid policies.

Merely having the satellites' data is not enough, however. As growing numbers of users have become increasingly dependent on the information, officials have found both their distribution plans and the limited availability of interpretation expertise to be bottlenecks in getting out the word. "It is time," says the program of the upcoming annual meeting of the American Association for the Advancement of Science, which is devoting an entire session to the problem, "to develop the operational hardware systems and particularly the administrative and management organizations to make the benefits of space observations available to all nations." □



ERTS-B's detailed wheat monitoring could lead to an accurate global cropwatch.

Insect-resistant corn found

The "numbers game" is starting to pay off for a team of agricultural researchers. After screening thousands of exotic corn varieties for resistance to insect pests, they have discovered several varieties that can withstand the attack of two of the most damaging pests, the European corn borer and the sugar cane borer.

Vernon E. Gracen and former graduate student Sue Sullivan of Cornell University and colleagues at the International Center for Maize and Wheat in Mexico have announced finding the