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." □

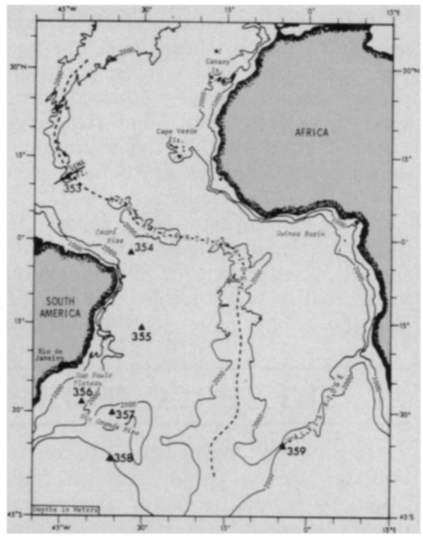
The mighty Amazon reveals her age

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