Antarctic voyage of discovery

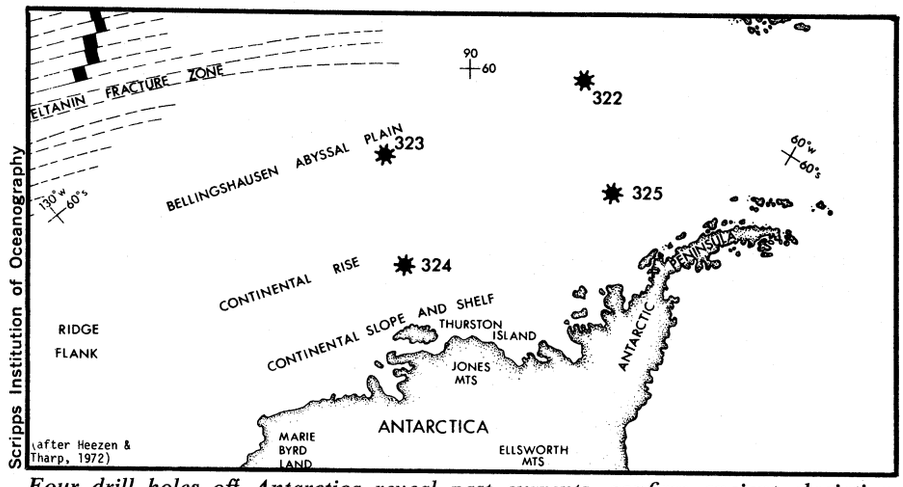
Like a scholar delving into an ancient original manuscript, the scientists on the Glomar Challenger's epic voyages in the Deep Sea Drilling Project decipher the record of the earth's past from cores extracted beneath the ocean's bottom.

In early 1973, the Glomar Challenger drilled for the first time in the waters off Antarctica, discovering, among other things, that glaciation had begun on the continent 20 million years ago, far earlier than thought (SN: 3/31/73, p. 204).

Now the drilling vessel has completed its second Antarctic voyage. Despite almost unending mechanical malfunctions plus occasional 60-mile-an-hour winds, high seas and snow squalls, the Challenger managed to drill four holes and uncover an impressive variety of scientific information. It confirmed the 20-million-year-ago glaciation, discovered an immense layer of iron-rich sediments, identified once-vigorous sea-bottom currents, and detected evidence for a former strong circumpolar current.

The voyage, Leg 35 of the DSDP, was conducted in February and March. Co-chief scientists were C. D. Hollister of the Woods Hole Oceanographic Institution and Campbell Craddock of the University of Wisconsin. The National Science Foundation funds the project; the Scripps Institution of Oceanography manages it.

Like sand barges carrying a load of gravel out to sea, ice shelves that break off the Antarctic continent and become icebergs carry pebbles and other debris out onto the ocean. When the floating ice eventually melts, this ice-rafted debris sinks to the bottom and becomes incorporated into the ocean sediments. Its presence in sediment cores is an unmistakable sign of continental glaciation. The 1973 Antarctic drilling found such glacial debris in sediment layers 20 million years old, and now the 1974 voyage has found the same thing.



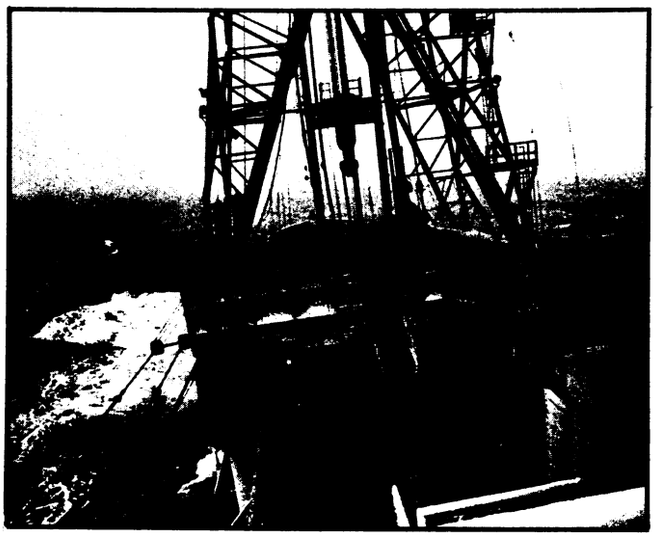
Four drill holes off Antarctica reveal past currents, confirm ancient glaciation.

But there are some puzzling gaps in the glacial record, and Leg 35 may have helped discover why. The four holes drilled this year and the eight last year differ in their glacial record according to position. The key seems to be the 63-degree line of south latitude. All the sites south of 63 degrees had evidence of glaciation back 20 million years. All the sites north of 63 degrees had evidence of glaciation back only to 5 million years. "Looking at this," says Scripps geologist N. Terence Edgar, the chief scientist for the entire DSDP, "we feel there was a strong circumpolar current [begining about five million years ago] that inhibited the northward flow of icebergs."

Another finding sure to cause considerable interest is a vast layer of iron-rich sub-bottom sediments. Earlier voyages of the Challenger found iron-rich sediments in the equatorial Pacific. The latest Antarctic voyage found the same thing. "We found iron-rich sediments of exactly the same description as found earlier in the equatorial Pacific," says Edgar. "It may be of immense value and be spread over a tremendous area." It is not yet known if the Antarctic iron-rich sediments are continous with those in the equatorial Pacific, but, says Edgar, "They could be of major economic significance."

Difficulties of exploitation would be immense, however. The iron-rich sediments were 400 to 700 meters beneath the ocean floor, which is itself below 5,000 meters of water.

The Challenger's southern voyage also found that thick sediment accumulations off the Antarctic coast have been sculpted by bottom currents for the last 30 to 40 million years. This process may have begun when South America and Antarctica separated, opening a passage for the cold water of the Weddell Sea to flow westward along the continental rise of West Antarctica. This current was found to have decreased in intensity since its inception. □



Snow squalls, high seas, strong winds and pesky mechanical difficulties cut heavily into time for drilling during the Glomar Challenger's second Antarctic voyage.

Scripps

Digestible milk

As noted in this week's cover story on famine relief, millions of people throughout the world are unable to digest cow's milk and thus do not benefit from the huge shipments of milk often included in relief packages. This situation may soon be eased through a discovery by two researchers at the University of Rhode Island, who announced this week they have found a way to artificially break down the objectionable component, lactose sugar, before the milk is sold.

Most babies have an enzyme that breaks lactose into simple sugars, but adults in Asia and Africa lose this ability as they grow older. By substituting a synthetic enzymatic process, Arthur Rand and James H. Hourigan say they have produced a milk that almost all people will be able to digest. Their product will have a slightly sweeter taste, but the same caloric and nutritional value as regular milk. □