

## GEOPHYSICS

### Nature of the earth's crust

On the Bay of Pozzuoli near Naples, Italy, three ancient marble columns have provided a record of crustal movements for more than 2,000 years. In early 1970, a conspicuous upheaval of the ground under the area cracked some old stone walls. The most recent upheaval was March 1970. Changes in the height of bench marks around the area show a maximum upheaval of about 90 centimeters.

But, points out Izumi Yokoyama of Japan's Hokkaido University, no earthquakes accompanied this upheaval. Italian researchers making seismic measurements at and around the area found evidence of only a few microearthquakes.

The absence of earthquakes, Yokoyama writes in the Feb. 19 *NATURE*, could be explained if the upheaval were due to the visco-elastic properties of the earth's crust. If the upper part of the crust is visco-elastic, he reasons, there could be two stages, the first in which deformation is proportional to the frequency of earthquakes and the second when there are no earthquakes but there is nevertheless visco-elastic activity in the upper crustal material. The Pozzuoli upheaval, he says, could be an example of the second stage.

## GLACIOLOGY

### Formation of Antarctic cirques

The ridges above the Wright Valley in Antarctica's McMurdo Oasis contain a number of half-bowl-shaped indentations called cirques. It is generally believed cirques are the result of erosion by glaciers, and principal theories of the erosion process all involve temperatures around the freezing point of water.

M. J. Selby and A. T. Wilson of the University of Waikato in New Zealand found that the cirque and small valley glaciers of the McMurdo area are composed of ice with a temperature of about minus 20 degrees C., and that at present the glaciers are not eroding their beds.

The cirques of the McMurdo region, the scientists conclude in the Feb. 26 *NATURE*, must have been cut when Antarctica had a temperate climate. They estimate that a position 17 degrees farther north would be necessary for similar erosion to occur with present climatic conditions.

The probable rate of southward drift of Antarctica suggests a minimum age of 9.5 million years for the cirques, the scientists report, but since paleomagnetic data show that the area was last north of the Antarctic Circle 50 million years ago, the cirques could be much older.

## GEOMAGNETISM

### Seasonal variations in activity

Several researchers have noted a tendency for geomagnetic disturbances to be greater near the time of the summer solstice in the Northern Hemisphere, when the sun's path reaches its northernmost point (usually June 21), than near the winter solstice, when the sun touches its southern extremity.

Dr. Oliver R. Wulf of the California Institute of Technology studied records from four stations, two in the Northern Hemisphere and two in the Southern, over a period of 22 years. If magnetic susceptibility is really tied to the solstices, he reasons, a given disturbance would be recorded more strongly in the hemisphere closest to summer solstice.

He reports in the March 1 *JOURNAL of GEOPHYSICAL RESEARCH* that at all four stations the sum of the values for the two months near the summer solstice is greater than that for the two months near the winter solstice. The pair of stations in lower latitudes, he adds, show this winter-summer difference less strongly than those in higher latitudes.

## PALEONTOLOGY

### Supernovas and dinosaur extinction

About 65 million years ago many living organisms, such as the dinosaurs and phytoplankton, underwent severe attenuation in diversity or became extinct during a relatively brief period of time.

In Feb. 19 *NATURE*, Drs. Dale Russell of the Canadian National Museum of Natural Sciences and Wallace Tucker of American Science and Engineering in Cambridge, Mass., suggest that a nearby supernova explosion might have produced climatic effects so drastic as to cause these extinctions. The recent discovery of pulsars, the scientists point out, suggests that large fluxes of cosmic and gamma rays are produced in the early stages of supernova outburst. Such enormous doses of radiation, they believe, could heat the top of the atmosphere to create ascending motions in the stratosphere. This would make the lower atmosphere unstable, with drastic short-term effects and a long-term lowering of temperatures.

The biostratigraphic record suggests, they point out, that a temperature drop was involved in the extinctions. The supernova theory, they conclude, predicts effects that agree more closely with the record than other theories advanced to explain the extinctions.

## METEORITICS

### Allende meteorite shower

Just over two years ago, the largest stony meteorite ever observed to fall exploded into thousands of pieces and showered the Allende valley in north central Mexico. Two tons of fragments, estimated to be less than half the total, were recovered along a path 30 miles long. The largest piece weighed 225 pounds.

Roy S. Clarke Jr. and Dr. Brian Mason of the Smithsonian Institution traveled to the site and collected 300 pounds of the material for study.

Last month Clarke and Dr. Mason and four colleagues issued the detailed results of their studies. They report that the meteoroid entered the atmosphere at a low angle as a single large body with a velocity between 11 and 18 kilometers per second. The meteorite was composed mostly of iron oxide, magnesium oxide and silicon dioxide but contained traces of many elements. A unique feature, the scientists say, is a lustrous fusion crust. The meteorite, a carbonaceous chondrite, is the largest of this type yet recovered.