

Jr.—propose in the Oct. 27 *SCIENCE* still another explanation for aging. It is blockage of normal cell replication. This appears to be the first time that such a concept has been seriously presented to the scientific community.

When cells normally reproduce themselves, they synthesize DNA, then undergo cell division. The new DNA is incorporated into the daughter cells. When these cells are ready to replicate, they synthesize more DNA, then divide. The granddaughter cells receive the new DNA. And so on. This way cell lines are able to perpetuate themselves, whether in the laboratory or in the intact organism. The concept Gelfant and Smith present, essentially, is that normal cell proliferation can be stopped either between cell rest and DNA synthesis (the G_1 phase) or between DNA synthesis and cell division (the G_2 phase). Blockage at either or both phases is an expression of cellular aging.

They cite ample evidence collected by Gelfant and other investigators to support this hypothesis. For example, normal animal cells cannot be maintained outside the living body indefinitely. This limited life span is expressed in the proliferative capacity of the cells in culture and is also directly related to the age of the donor from which the cultured cells were taken. The maximum life span of human diploid (dividing) cells in culture is about 10 months. This life span represents some 50 doublings of the cell population, and it applies to cells taken from the youngest possible tissue—human fetal tissue. On the other hand, shortened life spans and progressively fewer doublings of the cell population are observed in cultures originating from adult and old human tissues. Analyses of the cell cycles of both adult and embryonic human diploid cells, during various growth phases in culture, show that decrease in proliferation associated with aging is due to cells becoming blocked at either the G_1 or G_2 phases. Gradual transition from normal proliferation to blocked cells has been noted in rat tongue, rat liver, chick lens and in the pancreas of newborn rats. There is direct evidence in living animals for transition from normal proliferation to cells blocked between DNA synthesis and cell division.

The authors present evidence that blockage of cell reproduction can be reversed by certain immunosuppressant drugs. Hydrocortisone or antiserum against lymphocytes can release G_2 -blocked cells so they are able once again to replicate themselves. For this reason Gelfant strongly suspects that abnormal, excessive activity of the body's normal immune mechanisms may somehow block cell replication (cause aging). □

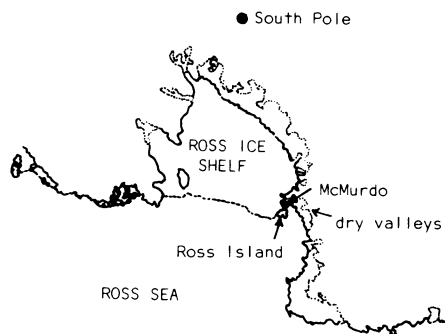
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Drilling into the geologic history of Antarctica

Most of Antarctica is sheathed in a thick permanent layer of ice that shields it from the probings of scientists. But near the United States' McMurdo Station are areas known as dry valleys, which have been free of ice for several hundred thousand years. It is in these dry valleys that some of the first penetrations into the Antarctic Continent will be made.

The Dry Valley Drilling Project, a three-year international study, will drill into at least 10 sites on the continent. Last week the National Science Foundation announced that the first borehole will be drilled in January and February 1973 on Ross Island. DVDP project coordinator Lyle D. McGinnis of Northern Illinois University says that with this initial hole the 30 scientists from Japan, New Zealand and the United States hope to drill some 600 meters into interbedded volcanic and glacial deposits. The areas now free of ice have not always been that way, he explains; over the past 10 million years there have been periodic glaciations. In addition, Ross Island is a volcanic complex, containing an active volcano, 12,000-foot Mt. Erebus. Potassium-argon dating of the volcanic remains should give a chronological scale. This will be combined with paleontological, geochemical and magnetic studies to derive the geologic and climatic history of the region for the past 65 million years.

The first borehole will also serve to test the drilling rig. Standing about 20 feet high and weighing some 15,000



L. A. Purrett

Antarctica: Target for drillers.

pounds, the rig is conventional in appearance. But the techniques used will have to be unconventional because the geologists will be drilling in frozen ground probably colder than any other region of earth. The drilling team includes two Canadian drillers experienced in drilling in the Arctic. The rig is capable of drilling as much as a mile deep. McGinnis says an attempt to drill that deep will be made at the second hole, planned for McMurdo Sound.

Meanwhile, another team of scientists on Leg 28 of the Deep Sea Drilling Project will be drilling in the Ross Sea, within 100 to 150 miles of McMurdo. This will be the first time the Glomar Challenger has drilled into Antarctic waters and was one of the major reasons the project was extended (SN: 4/1/72, p. 216). Results from the two projects will be used to trace the geologic and climatic history of the continent. □

Nobels in economics

The Nobel Prize in Economics, the fifth and final Nobel of 1972, was awarded last week to two economic theorists. The Swedish Academy of Sciences announced that the \$100,000 Prize would be shared by John R. Hicks of Oxford University and Kenneth J. Arrow of Harvard University for "their pioneering contributions to general economic equilibrium theory and welfare theory." The economists



Arrow's economic theories will shape future legislation.

were also cited for contributions in other fields: Hicks in monetary and business-cycle theory and Arrow in growth theory and decision theory. Arrow's most important contribution, says James S. Duesenberry of Harvard, is his "Impossibility Theorem." Arrow showed mathematically that it is impossible for any system of voting to reflect perfectly the wishes of the electorate. In other words, there is not and in principle cannot be, any perfect form of government.

Paul A. Samuelson of Harvard, winner of the 1970 Nobel Prize in Economics, said of the winners, "Their esoteric-appearing writings provide the new theoretical systems out of which legislation of the future will be shaped."

The award to Arrow makes it three out of four times that the United States has won or shared in the economics Prize since it was established in 1969. Arrow is the eighth U.S. scientists to share in a Nobel Prize this year. □

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