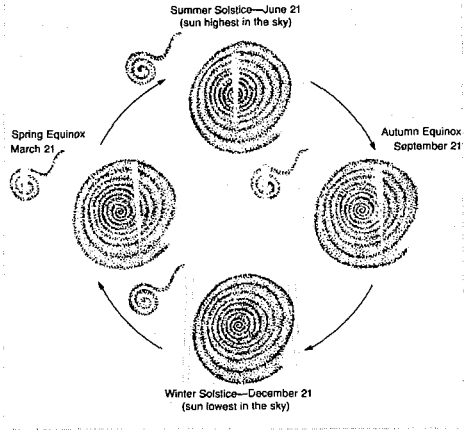
SCIENCE & TECHNOLOGY



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American Indians carved two spirals on a cliff to make this solar calendar. Two rays of sunlight change position with the seasons.

ing solstices and equinoxes. (At summer solstice, for example, the larger ray vertically bisects the larger spiral; at winter solstice, the two daggers of light perfectly frame it.)

The Fajada Calendar is only the most recently discovered remnant of an unusually advanced Anasazi culture, reports Frazier, a freelance writer. The Anasazi flourished in the nearby Chaco Canyon between A.D. 800 and 1250. Skilled builders and traders, they developed advanced irrigation systems and lived in massive, sophisticated pueblos. One multistoried complex contained some 800 rooms. Between 30 and 40 Anasazi towns were linked by hundreds of miles of smooth dirt roads, some 30 feet wide. The roads also led to agricultural areas and rock quarries, indicating a highly organized network of farming, manufacturing, and commerce.

The calendar is as accurate as any known mechanism built by the advanced Mayans of 9th-century Central America. It reveals a knowledge of geometry and astronomy previously unknown among North American Indians. Yet it has not, to date, shed any new light on the mysterious decline of the Anasazi in the 13th century.

One-Celled Wonders

"A Biological Network to Safeguard Nature's Unseen Assets" by Edgar J. Da-Silva, in *Impact of Science on Society* (vol. 29, no. 3, 1979), UNESCO, 7 Place de Fontenoy, 75700 Paris, France.

Man uses microorganisms for a staggering array of tasks. Rhizobia enrich soil by helping plants trap nitrogen from the air. Penicillin and streptomycin are important vaccines. Petroleum-eating pseudomona may soon fight oil spills.

Apart from the technical challenges of discovering and isolating new microbes, scientists in the field have faced critical logistical difficulties—getting news of recent microbe finds and locating reserves of valuable strains. But a new program at the United Nations has been coming to their aid, helping to shape the direction of new research in the process, reports DaSilva, of the UN Educational, Scientific, and Cultural Organization (UNESCO).

In the past eight years, UNESCO, the UN Environment Program, and the UNESCO-related International Cell Research Organization have opened Microbiological Resource Centers in Australia, Thailand, Sweden, Kenya, and Brazil. By monitoring worldwide research and keeping records of discoveries, these institutes are starting to serve as reference centers for microbe specialists. They can help experts find and obtain strains they need, and identify projects and experiments that could benefit from microbe supplies on file. (Tens of thousands of microbe strains are catalogued in the system's directory.) They also train new microbe specialists from developing countries and promote new applications of microbiology—such as water purification, conversion of garbage to methane fuel, and even the microbial manufacture of solar energy.

The UN microbe centers are particularly interested in using microbes to aid agriculture and industry in the Third World. Microbes able to convert carbon dioxide into protein could combat hunger. And UN economists view microbial methane production as precisely the kind of low-technology industry that developing countries need to promote lasting and equitable growth.

RESOURCES & ENVIRONMENT

Early Man's Climate Changes

"Anthropogenic Albedo Changes and the Earth's Climate" by Carl Sagan, Owen B. Toon, and James B. Pollack, in *Science* (Dec. 21, 1979), 1515 Massachusetts Ave. N.W., Washington, D.C. 20005.

Long before the advent of modern industry and technology, man had drastically modified the Earth's surface. Sagan, a Cornell astronomer, and Toon and Pollack, NASA research scientists, note that the major manmade changes have coincided with climate shifts, and suggest that the two phenomena are linked.

Roughly 15 percent of the Earth's surface has been changed by man. Twenty thousand years ago, the use of fire had already greatly changed world vegetation patterns. In the 16th century, Spain's explorer Ferdinand Magellan saw just how this could happen. When he rounded Cape Horn, he noticed so many fires set by South American Indians