Fossil chemicals: Life among the ruins

Silently, inexorably, stromatolite is forming. In turquoise coves around Bermuda and the Bahamas, this laminated, sedimentary rock is being formed by the life and death of algae. The real heyday of stromatolite formation, though, occurred eons ago—about 2.3 billion years ago, to be exact—back when shallow seas covered a large part of the earth and protozoans were the dominant life form. A stromatolite sample, dating back to that dim age, has now yielded what may be the oldest known biochemicals formed and fossilized within a rock.

Geochemists John E. Zumberge and Bartholomew Nagy of the University of Arizona report these indigenous biochemical fossils in the June 26 NATURE. Indigenous in this context means that the biochemicals—two cyclic ethers—were formed within the rock during the long geologic time following the rock's formation. Using isotope dating, rocks found nearby have been dated at 2.3 billion years.

There has been controversy over the origin and age of indigenous biochemicals, since many substances that are soluble in water and other solvents can invade an ancient rock and be wrongly dated as old as the rock itself. The team, however, took a series of analytical precautions designed to ensure the two cyclic ethers they found actually were formed by the stromatolite materials themselves, and were not intrusive compounds.

The rock samples were taken from an arid mountainous area 315 kilometers northeast of Johannesburg, South Africa. During the stromatolite formation 2.3 billion years ago, this probably was an area of tidal flats bordering a shallow sea, Nagy says. The same outcropping of stratified rock has yielded a wealth of information. Lois Anne Nagy reported last year finding preserved fossil blue-green algae that show the first known evidences of cell diversification. These ancient algae and their specialized cells (called heterocysts and akinites) may have formed the precursors to the newly discovered fossil biochemicals, Nagy says.

The algae, like their living blue-green counterparts, probably gave off gluey sugars called mucopolysaccharides. The structural units in these long-chain sugars are six-carbon sugars such as glucose. Long after the organisms died, these six-carbon molecules could, through a series of hypothetical reactions Nagy and Zumberge propose, be converted to the cyclic ethers they found. The chemicals are, 2-*n*-propyl-3-methyltetrahydrofuran and 2-*n*-propyltetrahydropyran.

The finding shows, Nagy says, that complex biochemical reactions could have been going on within sedimentary rocks even in the Precambrian. This lends chemical proof to last year's visual proof (of cell diversification) that the evolution of life had already reached a high level by that time, Nagy says. □

Skywatch network ends 18-year vigil

Project Moonwatch is dead.

The worldwide, volunteer, satellite-tracking network, established in 1957 by the Smithsonian Astrophysical Observatory, began with a triumph in its first year by being the only organized source of visual sky observations available when the Soviet Union surprised the world with Sputnik 1. That first, momentous satellite was launched on October 4, 1957, five months before Project Moonwatch was to be fully operational, yet the first confirmed sightings of it came only four days later from Moonwatch teams in Sydney and Woomera, Australia. On Oct. 10, the first U.S. sightings were made by a group from New Haven, Conn.

Since then, more than 5,000 volunteers ranging from young students to professional astronomers have contributed more than 400,000 observations of low-perigee and reentering satellites and spacecraft.

The seeds of Project Moonwatch were sown when the National Academy of Sciences and the National Science Foundation gave the SAO responsibility for optical tracking of satellites anticipated to be launched during the 1957-58 International Geophysical Year. Noted astronomer Fred L. Whipple, then SAO director, designed the Baker-Nunn tracking camera to handle the task from 12 selected sites around the world, and sent requests to amateur astronomy groups to provide preliminary sightings for the tracking stations.

Because of the excitement surrounding the coming IGY, the response was immediate. By spring of 1957, there were more than 70 Moonwatch teams in the United States, with others forming in foreign countries. Then Sputnik 1 was launched and by the end of the year, 115 U.S. teams and 90 in other countries had already provided more than 700 observations of the initial Soviet probe and its successor, Sputnik 2.

Although other and more sophisticated tracking systems have since been set up by various agencies, the wide distribution of Project Moonwatch teams has made them a useful source of such information as low-perigee tracking data, wherein objects are orbiting so close to the earth that their high speed often eludes cameras and radar.

An additional system called the Volunteer Flight Officer Network grew in 1969 from an unofficial system set up six years before by Herbert Roth of United Airlines' flight training section, calling for flight personnel to report observations ranging from reentering satellites to UFO's. The VFON eventually grew to include members from 120 airlines representing, says the SAO, "every country of the world, with the exception of Russia, Japan and the People's Republic of China." But VFON, too, is being disbanded.

The reason, says one SAO official, is largely one of no money, even though Project Moonwatch's current budget is down in the vicinity of $30,000 a year. But more sorely missed than Moonwatch tracking data, perhaps, will be its influence among its younger members—influence in the most grass-roots sense—that has fed fledgling interests in space, in astronomy . . . and in simply looking up. □

Sic transit gloria synchrotroni

The Proton Synchrotron at the CERN laboratory in Geneva, which accelerates protons to energies up to 30 billion electron-volts (30 GeV), was once one of the two most powerful particle accelerators in the world. The darling of Europe's particle physicists, its construction was the original reason for establishing the international laboratory that has given such a supranational flavor to European physics.

But in recent years the accelerator has been surpassed, first by the 70-GeV machine at Serpukhov in Russia and lately by the 400-GeV one at FermiLab in Illinois. Soon it will be eclipsed on its own home ground by the Super Proton Synchrotron, CERN's 400-GeV entry.

What happens to old synchrotrons when they are outdone? Some die; some fade away, and some, like the Lawrence Berkeley Laboratory's Bevatron, become ion accelerators. The last option may be, in part, the CERN synchrotron's future. When the 400-GeV machine is finished, the older synchrotron's ordinary protons will be used mainly to feed it and the already operating Intersecting Storage Rings. But there will be some working time left over, and according to a note in the June CERN Courier, the laboratory's administrators are thinking of using that time to accelerate light ions and polarized protons.

Accelerated ions are taking nuclear physics into new territory, and polarized protons, beams in which all the spins are oriented the same way, are uncovering some strange, delicate effects that depend on particle spin. Turning the proton synchrotron to the advantage of these two studies would give them both healthy energy boosts, and would ensure it a longer working life as a primary experimental facility. Feasibility studies are under way, and decisions will probably be made by the end of 1976. □