

Reynolds Metals Company

## UNDERSEA MANGANESE

### OCEANOGRAPHY

## Manganese 'Road' Found in Ocean

➤ AN UNDERSEA "road" has been discovered off the coast of Florida, Georgia and South Carolina. A relatively flat underwater terrace extending to depths of 3,000 feet has been found covered by a pavement of manganese oxide.

The Aluminaut, the world's deepest diving submarine, discovered the highway along a 150-mile by 100-mile area off the southern coast of the United States.

"The Gulf Stream currents evidently keep the pavement swept clean of sediment so that it resembles a black top road. We attached wheels to the Aluminaut and it actually rode along the deposits as though it was on a country road," reported Arthur L. Markel, vice president and general manager of Reynolds Submarine Services Corporation, operators of the sub.

What is believed to be the largest specimen of manganese oxide ever raised from the ocean bottom, a 198-pound slab, was brought to the surface in the Aluminaut's "arms."

Reynolds Metals Company geologists believe that the samples will exceed the minimum standards for commercial grades of manganese oxide, which is used widely in metal and chemical industries. Steel companies alone annually purchase about 1,719,000 tons of manganese oxide to strengthen and harden steel products. For use in fertilizers, photography, pulp and paper, the chemical industry buys 95,000 tons yearly and 28,000 tons go into the manufacture of dry cell batteries.



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### PALEONTOLOGY

## Dinosaur Cells Preserved

➤ AN 80-MILLION-YEAR-OLD dinosaur bone has been found in the Gobi Desert of Southern Mongolia with preserved collagen fiber and cells.

Studies of ground sections of bone under the electron microscope by three Polish scientists revealed that preservation of substances similar to those in fresh bone tissue was probably due to a "border barrier," which separated them from the rest of the bone.

Collagen, the sticky protein substance in connective tissue around joints, has been found in mummified human remains several thousand years old, and in mastodon bones preserved under permafrost conditions. Bone fragments after glacier preservation have been reported to have all the appearances of fresh bone.

It is only recently that studies on

Pleistocene bones have demonstrated that it is also possible to observe collagen and other organic material in a fossil bone. Electron micrographs of fossil bones of a deer-like animal from the Miocene period 25 million years ago revealed collagen fibrils and intact walls of conducting channels.

The 80-million-year-old bone was from the Upper Cretaceous period; it was collected during a joint Polish-Mongolian paleontological expedition in 1965.

Reporting the study in *Nature*, 211:655, 1966, were Drs. R. Pawlicki and A. Korbel of the Institute of Histology of the Polish Medical Academy, Krakow, and Dr. H. Kubiak of the Institute of Systematic Zoology of the Polish Academy of Sciences, Krakow.

### TECHNOLOGY

## Solar Cells Heal Selves

➤ A NEW SPACECRAFT power source could reportedly operate indefinitely even in the intense radiation of the Van Allen Belts by repairing its own radiation damage.

The new silicon cell "may be 50 times more resistant to radiation damage than the solar cells . . . in most present spacecraft," said its developer, Radio Corporation of America.

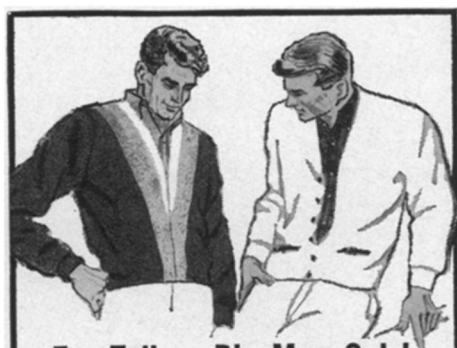
The crystals that make up solar cells consist of orderly rows of silicon atoms. Radiation damage occurs when a high-speed electron, proton or gamma ray bursts into a crystal and knocks one of the atoms out of position, leaving a gap that reduces the flow of current from the cell.

The self-healing cell gets its new lease on life from atoms of lithium within the crystal structure. Just like the backfield in a football game, when a hole develops in the line, the atoms rush in to fill the gap. Lithium atoms are much smaller than silicon atoms, so they can move around freely "in the manner of a gas."

Radiation-proof solar cells are vital needed if long-life satellites are to pierce high-intensity areas such as the Van Allen Belts. In 1962, four U.S. satellites—Injun, Ariel 1, Transit 4B and Traac—were in the Belts when a

hydrogen bomb called Project Starfish was detonated there. The satellites' power supplies had already been deteriorating because of radiation, but the sudden increase in radiation due to the bomb "killed" Transit and Traac completely in a matter of days.

Having learned this lesson, the National Aeronautics and Space Administration is anxious to test the cells in space. The first available payload space will probably be on the Applications Technology Satellite (ATS-A), to be launched around April 1967. ATS-A will carry as many as 30 experimental cells of different types.



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