Oldest known rocks found in Australia

Australian scientists report that they have found minerals 4.1 to 4.2 billion years old, by far the oldest rocks known on earth. The minerals, zircons, were discovered in western Australia near Mt. Narryer, embedded in sandstone that once was a river bed. The scientists suggest that the minerals wound up in the sedimentary rock after being eroded from the earth's silica-rich granitic crust. Crustal remnants of that age have not been found, but the finding raises hopes that some of the ancient crust still exists.

The zircons were unearthed by students working with William Compston, head of the isotope group at the Australian National University's Research School of Earth Sciences in Canberra, and colleagues. They focused their search in this remote region of the country after the Western Australian Institute of Technology and the Western Australian Geological Survey announced in 1981 that rocks from Mt. Narryer had been dated at 3.63 billion years old. The researchers report in a university publication that the finding implies that rocks containing high amounts of silica evolved on the earth's surface much earlier than was known previously.

Scientists estimate that the earth itself is about 4.5 billion years old, based on agreement between ages of meteorites believed to have formed at the same time as the planet, and ages of lead isotopes in the earth's rocks. The zircons, then, formed when the earth was only 300 million years old. The years between the formation of the earth and of the oldest rocks previously known, 3.8-billion-year-old rocks found in Greenland in 1973, have been a troublesome gap as scientists try to learn what happened on earth in its infancy. Many scientists believe that the metal core separated from the mantle within 100 million years as the planet accumulated material. Solving the question of when the crust separated from the mantle is more complicated. "We need measurements of the sort Compston is presenting in order to get on with it," says George W. Wetherill of the Carnegie Institution's Department of Terrestrial Magnetism in Washington, D.C.

"There are some fundamental interpretations that would be resolved if we could get back very close to the beginning," says Robert E. Zartman of the Isotope Geology Branch of the United States Geological Survey in Denver, Colo. The zircons are not old enough to resolve questions about melting episodes on the early earth, he says, "but if they can get rocks further and further back in time — like the suggested granitic rocks that may have been the source of the zircon — that suggests that the earth was chemically similar then to the way it is today."

Wetherill declined to comment specifically until seeing the final report, but says that any information supplied about the early earth is of "great importance." While the bombardment of the earth by bodies from space until at least 3.9 billion years ago as well as the earth's own active geology make it much harder to find ancient rocks, "I've never been convinced that the rocks weren't there, if you looked hard enough for them," he says. The finding, he adds, will encourage other people to search harder for remnants of early crust. Wetherill says that the "most plausible" understanding of early earth history is that the surface was relatively cool by 4.2 billion years ago, and that one would expect some rocks from that time to have crystallized. Until now it had not been demonstrated that any are still preserved near the surface. The zircons may have survived through the ages because they are highly resistant to weathering.

The dating was performed in Canberra with an instrument called an ion microprobe. The tool is derived from the more familiar mass spectrometer which sorts ionized material according to its mass. The ion microprobe has been adapted in the last 10 years to analyze the composition of single mineral grains, including the amounts of two forms, or isotopes, of uranium and lead. The relative quantities of these elements can be used to determine ages of rocks billions of years old.

— *C. Simon*

Bendectin production ends

Merrell Dow Pharmaceuticals Inc. has halted production of its controversial product Bendectin — the only drug approved by the Food and Drug Administration for treatment of morning sickness.

Bendectin has been linked in animal studies to a sometimes fatal birth defect called diaphragmatic hernia and to fetal heart defects (SN: 7/3/82, p. 7). More recently, use of the drug by pregnant women to combat nausea was linked to a stomach defect, called pyloric stenosis, in their offspring (SN: 1/1/83, p. 5). The Cincinnati-based Merrell Dow is the target of hundreds of lawsuits that claim Bendectin caused various birth defects.

Nonetheless, at a June 9 press conference in Washington, D.C., David Sharrock, president of Merrell Dow Pharmaceutical USA, announced that the company still contends the product is safe and that it has decided to quit producing Bendectin due to rising liability insurance premiums. (Lately, it has cost the company about $1 million per month to insure Bendectin.) Company spokespersons are telling pregnant women who have prescriptions for the product not to be alarmed by Merrell Dow's recent action and to continue using the drug. But the Public Citizen Health Research Group, which has questioned the safety of Bendectin for years, strongly recommends against its use. □

Aleutian arc primed for a great quake

Like an inverted "U" the Aleutian island arc curves across the North Pacific where the Pacific plate ducks beneath the overriding North American plate. While earthquakes are frequent in this area, scientists have been aware of a nagging seismic silence in a 300-kilometer-long stretch called the Shumagin gap. And when scientists recently tallied the probabilities for a quake in this area, they found that a great quake, as large as Richter magnitude 8.6 (± 0.3), is highly likely in the next 20 years.

The findings were presented at the recent meeting of the American Geophysical Union in Baltimore. The probabilities are based on the historical record, which includes seismic data from the United States Geological Survey and accounts gathered by the Russians until they sold Alaska in 1867. The scientists make no predictions, but say that the statistical probabilities show that there is a 16 to 90 percent chance for a great quake in the next 10 years, and a 30 to 99 percent likelihood that it will strike in the next 20 years. Klaus Jacob of Lamont Doherty Geological Observatory in Palisades, N.Y., says narrower ranges for the probabilities require more detail about the seismic history of the area than is available.

While Jacob and colleagues were studying aspects relating to potential quakes in the Shumagin gap, other Lamont scientists measuring crustal deformation noted an "unusual" event. Between 1978 and 1980 a piece of the descending slab slipped at depths between 70 km and 30 km beneath the surface. Slip often occurs without quakes at these depths because the crust is made pliant by high temperatures. But after this latest slip the vast stresses accumulated through plate movement presumably were concentrated in the cooler, brittle part of the crust at shallower depths, bringing the plate closer to rupture. "It turns out that this slip event did not merge into a great earthquake," Jacob says. "It should have, and it's a puzzle that it didn't."

Despite the recent slip, the probability of a great quake has not increased because the estimates are based only on intervals at which quakes recur on a given fault. The Shumagin gap is long overdue. The last great quake there that scientists are sure of occurred in 1848, and they believe that the average recurrence interval in the Aleutian arc is probably about 70 years. The main hazard posed by a great quake is the tsunami, or seismic sea wave, that is likely to be shoved southward, possibly causing damage and injury as far away as Hawaii. The Aleutians are sparsely populated, but hazards may increase if oil companies proceed with the drilling allowed by recent lease sales north of the Aleutian arc.

—*C. Simon*