University Devises New Time Machine

COLLEGE—A common question for scientists—howold is it?—has taken uncommon meaning for oceanographers at the University of Alaska's Institute of Marine Science (IMS).

For them, an answer of 23,450 years, give or take 250, is by no means unusual.

The institute's new time machine is a carbon-14 dating system that measures the amount of a radioactive carbon isotope—carbon-14— present in a sample, permitting a mathematical age derivation.

Dr. Williams S. Reeburgh, operator of the IMS time machine, explained how carbon dating works.

"Cosmic ray bombardment of the atmosphere produces an unstable isotope of carbon, carbon-14, which loses half its radioactivity in about 5500 years."

This carbon isotope, he said, is cycled through the atmosphere and is absorbed by all living things.

"When people, or trees, or shelled creatures die," he said, "they cease absorbing carbon-14, and the radioactive clock starts."

Radiocarbon dating was developed by a University of Chicage scientist, Dr. Willard F. Libby, for which he received a 1956 Nobel Prize.

Since then, Libby's technique has found widespread application in many fields. Noteworthy among them is archaeology, in which accurate dating made possible by the unstable isotope of common carbon has brought that science into a new era.

UA's new system is a modifi cation of the original carbon-14 time machines.

Instead of measuring the amount of radioactive carbon present in carbon dioxide gas generated by burning the original sample, UA's process goes several steps farther.

The original sample is burned in pure oxygen, resulting in carbon dioxide gas as in the original dating process. The gas is then converted to benzene, a petroluem refining by-product.

The benzene, containing the carbon-14 of the original sample, is placed in a scintillation counter which measures the quantity of isotope present.

Once the amount of carbon-14 present is known, the age can be easily computed.

Reeburgh points out two advantages of the benzene carbon-14 dating system. "First of all, by concentrating the carbon before measuring we gain sensitivity."

His second selling-point for the new UA time machine is cost. "Our dating equipment cost about $15,000," he said, "whereas conventional systems cost on the order of ten times as much."

Oceanographic applications for the new dating system are numerous. "We'll begin by dating sediment samples," Reeburgh explains. "From there we plan to use other isotopes such as trutium—an isotope of hydrogen with a half-life of 12 years—to trace water movements, as well as continuing dating other types of samples with carbon-14."

The IMS time machine has yet to date its first sample. "We're still receiving equipment and have to run known samples to standardize our operating procedures before we tackle any unknowns," he said.

UA researchers expect their time machine to be operational this fall. "Once we get going," Reegurgh said, "we will be able to date samples for archaeologists, geologists, and other university researchers interested in dating materials."