Pharaoh's boat found in ancient pit

American and Egyptian investigators last month drilled into a large pit at the base of the Great Pyramid of Cheops and found the disassembled planks of a wooden boat that has been sealed inside for 4,600 years. The team also took samples of the air inside the pit, which are expected to reveal clues about the ancient atmosphere (SN: 9/12/87, p.172).

But the air may not be as pristine as the researchers had hoped. "It is unlikely that the air in the pit remained unchanged for 4,600 years," says team member Pieter Tans, who is working for the National Oceanic and Atmospheric Administration.

In 1954, archaeologists opened an identical neighboring pit and found a wooden boat that had survived the millennia in almost perfect condition. The original function of this boat and its newly discovered mate remains a point of debate. After opening the first pit, some experts had speculated that the boat was designed to carry the spirit of Cheops west with the setting sun. Others believe the boats were functional, and that one had transported the pharaoh's body to its resting place in the pyramid.

Coordinated by the Egyptian Antiquities Organization (EAO) and the Washington, D.C.-based National Geographic Society, the present project is a unique test of new, nondestructive techniques. Instead of opening the entire pit, the team spent two days drilling through a 63-inch limestone block that covered the pit. Through the 3 1/2-inch-diameter hole, they took air samples and inserted a miniature video camera and environmental probes while a specially designed air lock kept the outside air from contaminating the pit.

On a television monitor above the pit, the team watched as the camera revealed "the wooden planks of the ancient craft, covered by a mat and a sprinkling of fallen plaster," says Farouk El-Baz, director of the Center for Remote Sensing at Boston University.

After photographing the pit and sampling the air, the team resealed the hole. "This discovery is especially rewarding because it shows that artifacts ... no longer need be removed from their natural sites to make them meaningful," says Kamal Barakat of the EAO.

In planning the project, team members hoped to retrieve air samples from 4,600 years ago. If the pit has indeed remained sealed over the centuries, chemical analysis of this ancient air will help scientists determine whether concentrations of important trace gases, such as those implicated in the "greenhouse" effect, have risen in the meantime. However, according to Tans, "the limestone was extremely soft and porous, indicating that there might not be much ancient air in the pit."

He adds that carbon-14 dating and other measurements will indicate more clearly whether the air is untainted.

— *R. Monastersky*

Female fish fond of male's fiefdom

To the female bluehead wrasse, it's not the brilliant coloration or amorous displays that make a male most desirable, but rather his real estate holdings.

Females of this coral-reef species appear more concerned with *where* they mate during their daily spawning than with whom, according to Robert R. Warner, a biologist at the University of California at Santa Barbara. In Warner's study of reefs in the San Blas islands off Panama, the most coveted spawning sites are those where the current sweeps eggs away from the reef and its predators. The males who control these sites are most likely to mate.

According to behavioral ecologist Luther Brown at George Mason University in Fairfax, Va., Warner's study is one of a very few that have been able to unequivocally separate the appeal of a male animal's appearance and behavior from that of his territory. Warner was able to do this experimentally by removing dominant male wrasses from their territories and noting the reactions of the female fish. He found that the females remained loyal to specific spawning sites even after new males from elsewhere in the reef took over the newly vacated spots. This loyalty was demonstrated most strongly in two cases, in which females stayed at one site after the resident male moved into an adjacent site that was in plain view of his old territory, writes Warner in the October ANIMAL BEHAVIOR.

According to Warner, behavioral biologists have long assumed that coloration and courtship in male animals indicate that females judge these qualities in choosing their mates. "These studies have begun to show that we shouldn't jump to that conclusion with every species," he says.

But if female wrasses largely ignore coloration and courtship, why have these qualities evolved in male wrasses? That's the subject of Warner's next research. For now, he speculates that bright coloration may play a part in battles between males for sites. Courtship displays may signal to females that there are no predators lurking about and it is safe to spawn.

— *S. Weisburd*

Will sea animals help treat cancer?

Last week, two groups of researchers announced advances that may lead to anticancer medications from the sea.

Researchers at the University of Illinois at Urbana-Champaign have reproduced the first such marine product to be tested on humans, and researchers at Arizona State University (ASU) in Tempe have determined the structure of another substance that has had successful results in animal studies. Their findings appear in the Oct. 28 JOURNAL OF THE AMERICAN CHEMICAL SOCIETY.

The Illinois group has manufactured didemnin B, which naturally occurs in the pancake-shaped, backbone-less tunicate, *Tridemnun solidum*, more commonly known as a sea squirt. The group, however, has had difficulty closing the nine-unit cyclic peptide, which is a short-chain protein. So far they have produced only 20 milligrams total. It will be at least another year before the synthesis is perfected, organic chemist Kenneth L. Rinehart told SCIENCE NEWS.

In 1982, Rinehart isolated 25 grams of naturally occurring didemnin B from 600 pounds of tunicates for a phase I trial conducted by the National Cancer Institute at the University of Texas in San Antonio and at the University of Vermont in Burlington. The trial, which found the substance to be safe for humans, was completed last year. Phase II trials, which will determine didemnin B's effectiveness against various cancers, have just begun and will be finished in about one year, says Matthew Suffness, chief of the institute's natural products branch.

The other potential anticancer medication, dolastatin 10, is about 18 months away from clinical trials, says Arizona's G. Robert Pettit. He says his group is several weeks from synthesizing the five-unit peptide that naturally occurs in the sea hare, *Dolabella auricularia*, which resembles a large snail.

Pettit says he first looked to the sea 22 years ago because "we didn't know of any marine invertebrates with cancer and we assumed we can discover new types of drugs." Since 1972, he has isolated more than 40 dolastatins, 10 of which have been tested on animals. Dolastatin 10 has been the most successful. Pettit says it has cured mice with melanoma and has doubled the lifetimes of mice with leukemia.

If the substances prove effective in humans, researchers expect to mass-produce them by harvesting and breeding the animals or plugging the substances' genes into bacteria. The researchers, however, may not have to worry about any technique. Blue-green algae live near the animals and may produce the substances. If that's true, Suffness says, "we'll just ferment the algae." — *S. Eisenberg*