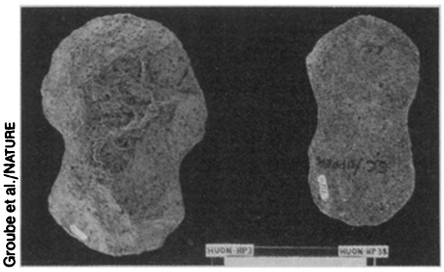
Early culture found in New Guinea

Investigators have uncovered evidence of the earliest known human occupation of the island of New Guinea, at least 40,000 years ago. This provides the first archaeological support for the suggestion that New Guinea was inhabited at an early stage in the settlement of Australia by people from Indonesia and Indochina; at the time, New Guinea and Australia were connected by a land bridge.



Groube et al./NATURE

Two of the waisted axes discovered along New Guinea's north coast.

Anthropologist Les Groube of the University of Papua New Guinea in Port Moresby and his colleagues uncovered more than 100 "waisted" stone axes at the north coast site. These axes are notched on both sides, giving the appearance of a waist, and are similar to tools found at Australian sites dated at 35,000 to 40,000 years old.

Several of the New Guinea axes are especially noteworthy, report the scientists in the Dec. 4 NATURE. Horizontal grooves on the stone implements indicate the axes were attached to some type of handle and, according to the researchers, provide the earliest evidence for the use of tool handles anywhere in the world.

The axes were found among a series of raised coral terraces that were once covered by water. Digging was conducted along a creekbank near one terrace dated, through a method measuring the decay of radioactive uranium and thorium, at between 45,000 and 53,000 years old. The researchers excavated three layers of sticky, clay-like volcanic material, in which the axes with handle grooves were found. Other axes were lying in the open, either on or just above the terrace.

Thermoluminescence dating, a technique based on the decay of radioactive potassium, was used to examine quartz particles from the volcanic accumulations. The three layers were estimated to be about 40,000 years old. This is a conservative estimate, say the investigators, since soil moisture at the site affects potassium decay and reduces thermoluminescence dates.

Before the new find, the earliest site in New Guinea containing waisted axes was dated at 26,000 years old.

"A distinctive 'waisted axe' culture appears to have existed in New Guinea and probably in Australia in the late Pleistocene [from around 60,000 to 10,000 years ago]," conclude the researchers. Archaeological evidence of forerunners for this culture in east and southeast Asia has not, however, been excavated.

—B. Bower

Reining in a runaway theory

Geoscientists have often wondered what kept the early earth from freezing over. Even though the sun was 25 to 30 percent dimmer during the earth's distant past, "there's no evidence for glaciation prior to 2.5 billion years ago, and there is positive evidence for liquid water at 3.8 billion years ago," says James F. Kasting, a NASA Ames researcher in Moffett Field, Calif.

Many scientists believe the greenhouse properties of carbon dioxide gas saved the early earth from a deep freeze. Atmospheric carbon dioxide traps heat radiated by the earth, thereby raising surface temperatures — a phenomenon, given today's rising carbon dioxide levels, that has many people worried about a future greenhouse effect. In order to counteract the cooler sun, says Kasting, the carbon dioxide concentration in the early atmosphere would have to have been at least 100 to 1,000 times today's level. In recent years, James C. G. Walker at the University of Michigan in Ann Arbor has suggested that even more carbon dioxide was present in the atmosphere.

According to Walker, some researchers have attacked this theory by contending that such high carbon dioxide levels would have caused a "runaway greenhouse" — a condition in which the earth's surface gets hot enough to boil away the oceans. However, in the Dec. 12 SCIENCE, Kasting and Thomas P. Ackerman say the runaway greenhouse scenario is unlikely. Their climate model indicates the early atmosphere was stable, even with carbon dioxide concentrations of 10^5 times what they are today.

Although carbon dioxide tends to raise temperatures through its greenhouse properties, it also provides part of the force that keeps temperatures in check. In this process, known as Rayleigh scattering, carbon dioxide molecules scatter solar radiation. When Kasting ran high concentrations of carbon dioxide through the model, he found that Rayleigh scattering would prevent significant amounts of solar radiation from reaching earth, ensuring that temperatures would not rise enough to cause a runaway greenhouse.

Kasting also applied his model of the early atmosphere to a second question — whether a geochemical process could have produced oxygen. The early atmosphere lacked free oxygen, but somewhere between 3.5 billion and 2.5 billion years ago, oxygen began to appear in the atmosphere. Most scientists believe that certain types of photosynthesis were the sources of this oxygen, says Kasting, but some have wondered whether sunlight could break apart atmospheric water (H_2O), liberating oxygen. His model suggests this process could not have produced significant amounts of oxygen.

Ruling out geochemical oxygen production makes it easier to pinpoint when oxygen-producing photosynthesis began, says Heinrich D. Holland of Harvard University. "If we find evidence of oxygen at 3.5 billion years ago, it means that green-plant photosynthesis was already active at that time, and that's what we seem to be seeing although the evidence is still equivocal," Holland says.

According to Walker, Kasting has made the idea of high carbon dioxide levels in the early atmosphere "more respectable" by precluding the possibility of a runaway greenhouse. "That," says Walker, "is going to stimulate new thinking, new research on geochemical processes and on chemical evolution." *—R. Monastersky*

Sulfite drug warnings

An estimated 500,000 to 1 million people in the United States may be sensitive to sulfites, a group of chemicals used as preservatives. Because many serious reactions, including 14 deaths in recent years, have been linked to sulfite use in restaurant salads and other foods, regulations were enacted earlier this year banning sulfites from fresh fruits and vegetables (SN: 8/17/85, p.100).

But an estimated 1,100 prescription drugs, mainly intravenous solutions or injectable medications, also rely on sulfites to reduce or prevent oxidation — a major cause of drug deterioration. To limit inadvertent life-threatening sulfite exposure, the Food and Drug Administration (FDA) announced last week that as of June 3, 1987, it will require that these drugs carry warning labels.

The largest group of sulfite-sensitive individuals appears to be asthmatics, 10 percent of whom may experience allergic-type sulfite reactions. Ironically, FDA notes, nearly all of the injectable epinephrine preparations used to treat severe allergic reactions contain sulfites. FDA has received more than 40 reports of possible sulfite reactions linked to these and other prescription drugs. Though no similar reactions have been linked to nonprescription drugs, members of the Washington, D.C.-based Proprietary Association, who manufacture 90 to 95 percent of all U.S. over-the-counter drugs, have volunteered to provide similar sulfite warnings on their products (SN: 12/21&28/85, p.397). □