stone, which feature two sharp edges converging to a point at one end. Studies suggest the hand-axes may have served as cutting tools for tasks such as butchering large animals and digging up tubers.

Investigators generally agree that direct ancestors of modern humans — principally *Homo erectus*, but also a more recent group known as archaic *Homo sapiens* — fashioned Acheulean artifacts. Runnels suspects that archaic *H. sapiens* produced the Greek hand-ax, since it dates to around the time when *H. erectus* disappears from the fossil record.

If additional Acheulean finds emerge during fieldwork at several nearby lake beds of a similar age, Runnels says, the archaeological evidence will support the theory that archaic *H. sapiens* — rather than *H. erectus* — first settled Europe.

Researchers have found several skulls of human ancestors at central European sites dating to about the time of the Greek hand-ax, but the classification of the fossils remains controversial, Runnels says. Moreover, the skulls came from sediment lacking any stone tools or other distinctive artifacts.

Although the new find helps to close a gaping hole in knowledge about human ancestors in central Europe during the early Stone Age, scientists cannot conclusively peg the flaked stone to either *H. erectus* or archaic *H. sapiens*, contends archaeologist Ofer Bar-Yosef of Harvard University. "We need skeletal material from the Greek site to confirm who made the hand-ax," he argues.

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Stone Age hand-ax, discovered in Greece, measures 9 inches long.

Bar-Yosef supports a theory that several waves of *H. erectus* first entered Europe sometime between 1 million and 500,000 years ago, migrating from Africa through the Middle East and then westward along the Mediterranean coast.

Next year, the Boston team plans to excavate the Greek site more thoroughly. Runnels points out that the soil contains clay that hinders the preservation of fossilized bones. "But before this year," he adds, "I wouldn't have given myself much of a chance of finding an Acheulean hand-ax at the site either." — *B. Bower*

Drug proves ace at fighting heart failure

A blood-vessel-dilating drug can prolong the survival of persons suffering from congestive heart failure, a chronic condition in which the heart's ability to pump is impaired, according to two independent groups of researchers. Their findings, announced this week, suggest such drug therapy may be able to prevent up to 20,000 deaths and 100,000 hospitalizations in the United States each year.

The new data confirm and extend earlier reports that angiotensin-converting-enzyme (ACE) inhibitors reduce the risk of early death for people with severe congestive heart failure. (ACE inhibitors belong to a group of drugs commonly used to treat hypertension by relaxing blood vessels.) The two new studies, detailed in the Aug. 1 New England Journal of Medicine, also demonstrate these drugs can benefit persons with mild to moderate heart failure.

Neither study applies to treatment of heart attack, in which the heart stops suddenly.

In one study, Salim Yusuf of the National Heart, Lung, and Blood Institute in Bethesda, Md., and investigators at 83 medical centers in the United States, Canada and Belgium randomly assigned 2,569 men and women with mild to moderate heart failure to daily treatment with either an ACE inhibitor (enalapril) or a placebo. Neither the patients nor the investigators knew which participants received enalapril. All volunteers continued to receive standard therapy for heart failure, such as the heart-strengthening drug digoxin.

Over a roughly 41-month treatment period, the researchers identified an 18 percent reduction in the risk of heart-related death for people taking the ACE inhibitor: Only 399 patients receiving enalapril died from heart failure, compared with 461 in the placebo group. The ACE inhibitor helped prevent the need for hospital visits as well. The team tallied 971 hospitalizations for heart failure in the placebo group — 42 percent more than among patients receiving enalapril.

In the second report, Jay N. Cohn of the University of Minnesota Medical School in Minneapolis and his colleagues present data suggesting that enalapril provides better protection for people with mild to moderate heart failure than a combination of hydralazine and isosorbide dinitrate, two other blood-vessel dilators.

Treating existing illness may offer only a partial victory in the battle against heart failure, these two groups of researchers agree. That's why Yusuf's team is now testing enalapril's ability to prevent chronic heart failure in people with some damage to the heart but no symptoms of long-term heart failure. Results of that trial are expected next year.

— *K.A. Fackelmann*

Cancer treatment uses 'suicide' gene

An unforeseen marriage between gene-transfer experiments and chemotherapy may offer safer human gene therapy and a potent anticancer weapon, researchers say.

On July 29, the National Institutes of Health Human Gene Therapy Subcommittee provisionally approved the experimental injection of 16 ovarian cancer patients with drug-sensitive tumor cells. Scott M. Freeman and his colleagues at the University of Rochester (N.Y.) Medical Center expect final approval for this anticancer trial within eight months.

Freeman's group plans to incorporate the thymidine kinase (tk) gene, isolated from the herpes simplex virus, into cultured human tumor cells. The enzyme this gene codes for plays an integral role in DNA synthesis and cell reproduction. Because the tk gene is sensitive to the antiviral drug ganciclovir, injecting patients with cells incorporating this gene should render their tumors susceptible to ganciclovir.

Freeman's team was surprised to find that when tumor cells carrying the tk gene were injected into mice, ganciclovir killed not only the newly added cells but also existing cancer cells. The exact mechanism remains unclear, but tk-negative cells might become tk-positive by absorbing fragments of the killed cells, Freeman says. There might also be a tumor-attacking immune response from ganciclovir's actions, he adds.

In the July issue of New Biologist, Elizabeth Nabel and her colleagues at the University of Michigan Medical Center in Ann Arbor propose a different use for the tk gene: including this "suicide" gene along with any other therapeutic gene to be incorporated by the body.

Any new genes added to the body carry with them some chance of triggering uncontrolled cell growth, although such tumors have not yet been seen in treated animals. Growth factor genes, which one day may fight cardiovascular disease by spurring blood vessel growth, cause particular concern, says Nabel.

Inserting the tk gene along with the new gene could provide an off-switch to the experimental therapy. "If you saw a tumor was growing, you might give the patient ganciclovir" and selectively kill the newly added cells and their progeny, Nabel says. In mice, ganciclovir eliminated most tumors spawned by injected tk-positive cancer cells, she reports.

The tk gene could serve as a safety feature, much like the brakes in a car, says Nabel. Human gene therapy has not yet needed such a measure. However, she argues, "the ability to regulate recombinant gene expression will become increasingly important." — *J. Travis*