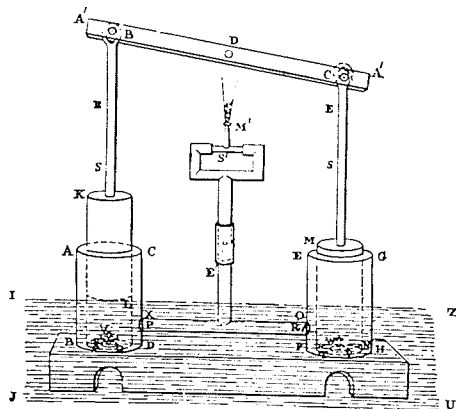


## SCIENCE &amp; TECHNOLOGY

Early Greek and Roman inventions included many toys—such as this steam-driven “fire engine,” designed by Hero in the second century B.C. But the ancients had little interest in finding practical uses for their scientific knowledge.



New York Public Library Picture Collection.

cal projects or by applying their knowledge only to tools of war (Archimedes' catapults and cranes, for instance).

Moreover, the Greeks and Romans believed that honorable wealth came from the land. Men who made money by other means—trading or industry—invested their profits in land rather than “research and development.” And farmers, who enjoyed a sellers' market, saw no reason to cut profits even temporarily by investing in machinery.

By A.D. 1200, however, Europe ceased to be a technological wasteland—thanks to Christianity. Monks who followed the Lord's example by working six days and resting on the seventh had spread the view that labor was exalted—even a religious act, like prayer. Every community had its water mill (there were more than 5,500 in England alone). Windmills were becoming a common sight. The pathetic image of Hephaestus the Smith had disappeared—replaced by manuscript drawings of God as Master Craftsman of the universe, with carpenter's square and scales.

### *Ancient Man, Modern Feud*

“The Politics of Paleoanthropology” by Constance Holden, in *Science* (Aug. 14, 1981), 1515 Massachusetts Ave. N.W., Washington, D.C. 20005.

Like reconstructing the plot of *War and Peace* from 13 random pages—that's how one anthropologist has described the challenge of piecing together man's family tree from fossil fragments. But paleoanthropology has experienced more war than peace in the last 10 years, reports Holden, a *Science* staff writer. The field remains split between supporters of two researchers—Richard Leakey of Kenya and Donald Johanson of the Cleveland Museum of Natural History.

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Both scholars ask the same question: For several million years, the line that evolved into *Homo sapiens* coexisted with the other prehuman species called the australopithecines, which later became extinct; when did they diverge? Leakey contends it happened five to eight million years ago. Johanson believes that modern man evolved more recently, between two and three million years ago. In 1974–75, in Ethiopia, Johanson discovered a “whole population” of hominid bones (the most famous specimen, dubbed Lucy, is 40 percent complete). Their age: more than 3.5 million years. Johanson attributed great variations in the fossils to differences between males and females and concluded that he had uncovered an entirely new species, the common ancestor of both australopithecines and modern man’s direct forerunners. Leakey contends that Johanson’s find represents two species, maybe more—certainly no common ancestor. The feud has been public and sometimes nasty.

Luck plays a big part in paleoanthropology, writes Holden. “Leakey had the luck to be born into the ruling dynasty of East African paleoanthropology” (his parents were Louis and Mary Leakey, both noted paleoanthropologists). “Johanson had the good fortune to find Lucy.” As a result, she writes, paleoanthropology will probably always be dominated by a few individuals—the ones who make the major finds, get the research grants, and stay in the public limelight.

But some of the most important research into man’s past has been taking place in laboratories, not in the field. X-rays of cross sections of bone can reveal areas of stress and strength and tell us much about our ancestors’ physical activities and capabilities. Paleoneurologists such as Ralph Holloway of Columbia are analyzing casts of the insides of early skulls, hoping to determine when speech developed. Microbiologist Jerold Lowenstein of the University of California School of Medicine in San Francisco is working to identify species-specific proteins. Projects such as these, says Holden, may one day untangle the very puzzle over which Leakey and Johanson now argue.

*Stones and Stars*

“Stone Age Science in Britain?” by Alvar Ellegård, in *Current Anthropology* (Apr. 1981), 5801 Ellis Ave., Chicago, Ill. 60637.

A 5,000-year-old astronomical observatory, revealing an understanding of algebra, geometry, and trigonometry—this recent explanation of Stonehenge, the mysterious circle of boulders southwest of London, has aroused the interest of many admittedly skeptical archaeologists. If correct, it may mark the first known instance of scientific endeavor in a rural, preliterate society.

However, the facts suggest otherwise, writes Ellegård, professor of English literature at Sweden’s University of Göteborg.

As early as the fourth millennium B.C., he writes, Briton farmers probably noticed that the sun’s point of rising “moves” north and south between two extreme positions (the solstices). And they no doubt ob-