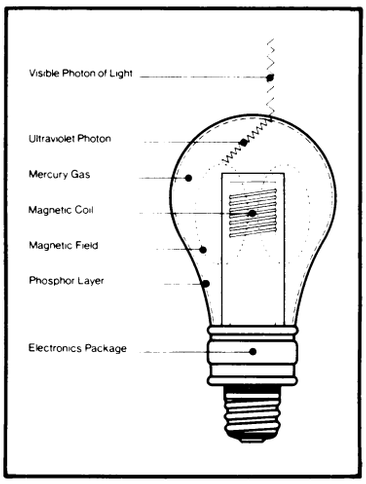
# TECHNOLOGY

## Superbulb




A revolution in home lighting appears to be brewing as the nation's leading electrical manufacturers scramble to compete with a tiny firm that last week announced development of a new lightbulb—one that uses 70 percent less energy than common incandescent lamps and may last a decade without burning out. Lighting costs Americans about $15 billion a year, and full nationwide use of the new bulbs might lead to energy savings equivalent to some 500,000 barrels of oil a day, according to preliminary studies.

The announcement was reminiscent of popular Thomas Edison stories: How an obscure California inventor had struggled for years to get financial backing for his revolutionary idea until finally the energy crisis stimulated necessary interest. The Energy Research and Development Administration (ERDA) called a press conference in Washington to introduce the inventor, Donald D. Hollister, and to announce a contract with his company, Lighting Technology Corp., to make the bulb ready for market. But things are not quite as simple as they first seemed.

The basic idea seems sound enough. The "Litek" lamp is essentially a fluorescent light crammed into an ordinary screw-type bulb, using recently developed solid state electronic elements instead of the bulky starters and ballasts usually associated with fluorescent devices. Built into the base of the bulb is a transistorized circuit that supplies radio-frequency current to a coil of wire in the center of the glass. An electromagnetic field set up around the coil energizes atoms of mercury vapor, causing them to emit ultraviolet rays. These rays hit the phosphor layer coated on the inside of the bulb, causing it to glow.

Ordinary fluorescent tubes have electrodes at each end across which a high voltage is created. Electrons passing between the electrodes excite the mercury atoms, causing the phosphor layer to fluoresce. The advantage of the new, electrodeless lamp is that it does not require as high a voltage and thus can use small electronic components. Also, the transistors will not burn out as readily as the electrodes in ordinary fluorescent lamps.

In an interview, Hollister said he hopes to use the ERDA money to get the new bulb ready for market within 18 months to two years, through further refining, testing and developing approaches for mass production. Specifically, he is considering the use of integrated circuitry in the base to cut costs (the bulbs would now cost as much as $10 each).

He may have some competition; spokesmen for each of the three largest lamp manufacturers told SCIENCE NEWS their companies have been working on similar developments. Hollister already has patents on some features of the new lamp, but several others are pending and these may be contested. In an official company response to the announcement, General Electric Co. claims to hold patents on "what could be the next cost-effective, energy-saving light source to be introduced—an electrodeless, magnetically excited, screw-base fluorescent lamp for use in incandescent lamp sockets." The race to the market appears to be on.

# EARTH SCIENCES

## Volcanic explosions and climatic change

Among all the possible causes for climatic change on earth, the role of volcanic explosions is gaining more and more interest. A year ago, scientists analyzing volcanic dust in deep sea core samples reported that the last two million years, a period of major and rapid fluctuation in climate, have been marked by abnormally high levels of volcanism (SN: 2/15/75, p. 100). The problem of a physical link is not as simple as it may seem. Volcanic particles not only reflect sunlight, a cooling effect; they also can, depending on size and composition, absorb infrared radiated from the earth's surface, a heating effect.

Four scientists from the Theoretical Studies Branch of NASA's Ames Research Center—James B. Pollack, Owen B. Toon, Audrey Summers and Betty Baldwin—plus Carl Sagan of Cornell and Warren Van Camp of Informatics, Inc., in Palo Alto, report a theoretical assessment of the subject in the Feb. 20 JOURNAL OF GEOPHYSICAL RESEARCH.

They conclude that during the first few months after a volcanic explosion, the two effects either cancel each other out or cause a small net warming of the surface and the stratosphere. But after that, smaller sized dust and sulfuric acid aerosol particles cause a net cooling. The combined effect over all stages is a net cooling of the surface.

They have compared their calculations with observations of past climatic variations and conclude: ". . . Changes in the level of volcanic activity have made a significant contribution to climatic changes that have occurred during the past several centuries, they may have influenced at least a portion of the last major ice age, and they can be expected to produce major episodic climatic changes lasting from a decade to a century every 1,000 to 1 million years."

## Downward toward the Moho

The Soviet Union is set to begin drilling a hole that scientists there expect to be the first to pierce the earth's crust and recover a sample of the mantle. The drilling will begin in April or May and is expected to reach a depth of 15,000 meters, according to a news report from Baku, Azerbaijan, 75 miles from the drill site at Saatly.

Saatly is in a lowland area 35 miles from the Iranian border in one of the few regions on land where the earth's mantle comes relatively close to the surface—an estimated 10 to 15 kilometers. But project director O.D. Ibragimov was quoted as saying that the mantle there may turn out to be only 7 kilometers beneath the surface. This is only slightly deeper than the penetration of a test well, called Sputnik, which reached a depth of 6,240 meters. The test-well took 20 months to drill and was said to be "very successful."

Saatly is one of 5 15-kilometer wells being drilled in the Soviet Union this decade, but Saatly apparently has the best chance to pierce the Mohorovičić discontinuity, or Moho, the boundary between the crust and mantle. The drilling is part of the International Geodynamics Project.

## Oldest fossil vertebrate

The oldest known fossil vertebrates are heterostracan fishes, from middle Ordovician sandstone in Colorado. Now T. Bockelie of Oslo's Paleontology Museum and R.A. Fortey of the British Museum report in the March 4 NATURE the discovery on Spitsbergen of fossil fragments of heterostracans from the earliest Ordovician, 500 million years ago, predating the Colorado specimens by 20 million years. They believe pre-Ordovician vertebrates are possible.