

## Science

## Higher temperatures renew greenhouse debate

By SUE RAMSEY  
Collegian Science Writer

When scientists learned that the earth's temperature reached its highest average last year, they renewed the debate over whether global warming is the cause.

Meteorologists have recorded yearly global temperatures for 110 years. The records show that the earth's annual average temperature is about 59 degrees Fahrenheit, said James F. Kasting, associate professor of geosciences and meteorology. In 1990, the National Aeronautic and Space Association reported that the earth's average temperature — 59.8 degrees Fahrenheit — surpassed the average of any other recorded year.

But most scientists agree that the temperature record does not necessarily indicate that the greenhouse effect is causing a warming trend,

said Lee Kump, assistant professor of geosciences.

The greenhouse effect is not a new phenomenon, Kump said. Without it, the earth's temperature would never rise above freezing.

Carbon dioxide molecules in the earth's atmosphere trap the sun's energy and prevent it from radiating back to outer space. This is called the greenhouse effect, because greenhouse windows use the same principle to trap heat for the plants inside.

When humans burn fossil fuels for energy, carbon dioxide is emitted into the atmosphere, adding to the natural warming, he said.

Scientists debate if greenhouse warming is affecting the earth's climate.

"It's a difficult problem. People are bound to argue until something definite happens," Kump said.

Bob Grumbine, a post doctoral research fellow in the meteorology department, said he

believes that global warming hasn't been proven. The data collected by temperature recording centers in North America do not provide an accurate representation of the earth's climate, Grumbine said.

Many of these centers have changed locations over the past century, he said, and in many cases the change in location has affected the temperature recordings.

"I'm not entirely sure that we've recorded a warming trend," Grumbine said.

Some scientists are skeptical because the natural variability of the planet's climate causes the temperature to vary many degrees from year to year. Because of these fluctuations, the true temperature trend is difficult to determine, Kasting said.

"You're not going to convince everyone that there is a greenhouse until the climate has changed enough that it goes beyond the natural variability," Alley said.

If the world's climate does significantly warm, Alley said, disaster is certain. Since the world's population is so large and humans have so much invested in the earth, any greenhouse warming would cause people to suffer. Whether it be wheat fields turning to deserts or Philadelphia becoming part of the Atlantic Ocean, some sacrifices will be made, he said.

Scientists also worry that about 300 feet of ice on Greenland and Antarctica will melt if the temperature increases, causing a rise in sea level and forcing people to abandon many coastal areas, Kasting said.

"It's going to be very expensive because a lot of our big cities and population centers are along the coasts," Kasting said.

Global warming's effects, however, may not hurt everyone.

"If we are going to warm up the climate and you live in Siberia, you'd probably be happy," said Richard Alley, an assistant professor of

geosciences and affiliate of the University's Earth Systems Science Center.

But nobody really knows what will happen, Alley said, adding that global warming may cause anything from mass disaster to mild improvement on the earth.

Because the possible disasters are so large, Alley suggested that people do something to slow the warming process. He said he is afraid these disasters may be triggered before scientists know how to stop them.

"If they made me king for a day I'd put a \$1 a gallon tax on gasoline and on all other fossil fuel sources," he said.

Kasting agreed with an increased gasoline tax, saying that Europe and Japan already charge a \$1 to \$2 tax per gallon. Such a tax would encourage energy conservation, he said.

"Energy independence is something we really need," Kasting said. "So we don't have to go and play policeman in the Middle East."

## Scientists seek sickle cell cure

By KATE WALKER  
Collegian Science Writer

University researchers are learning more about sickle cell anemia, a life-threatening blood disorder that afflicts about one African-American in 500.

Herbert H. Lipowsky, professor of engineering science and mechanics, is comparing the way normal red blood cells and sickled, or oxygen-deprived, red blood cells travel through the body.

Red blood cells contain a protein called hemoglobin that carries oxygen to the cells. Normal red blood cells are circular and flexible. But sickle cell anemia sufferers have defective hemoglobin, which deprives the red blood cells of oxygen, causing them to stiffen and take on a crescent shape.

The gene that causes the hemoglobin to be defective originated in Africa and is therefore more prevalent among African-Americans than other racial groups in America, Lipowsky said.

Lipowsky is observing the way the sickled cells travel through the microcirculatory system, which contains capillaries, the smallest blood vessels. The capillaries have a diameter of six to eight microns, about one-sixth the diameter of a human hair. Sickled cells have difficulty traveling through capillaries because of their stiffness.

The worst consequence of this disease which can be detected at birth through a blood test, is heart attack or stroke, Lipowsky said.

Lipowsky has conducted tests on normal and sickled cells using live, anesthetized tissue from animals.

The problem with sickled cells is that they give up their oxygen too fast, he said, thus leaving the surrounding tissues oxygen deprived, causing pain in the abdomen, extremities, joints and muscles of the afflicted person.

An important aim of this research is to determine how long the sickled cells remain in a low-oxygen area of the body, Lipowsky said.

Lisa Cram, a graduate student in bioengineering, is doing research similar to Lipowsky's.

Cram's experiment uses blood cells from a donor rat. The cells are incubated in a substance that stiffens the cells. This process simulates the effect of sickled cells traveling through the blood stream, she said.

The cells are then injected into a muscle of the rat and timed as they travel through the microcirculatory network, Cram said.

No cure exists for the disease, although patients can be temporarily relieved of their pain, Lipowsky said.

Lipowsky's research is published in journals such as the Journal of Clinical Investigation and Microvascular Research. Once in other journals, Lipowsky's findings are available to all researchers.

## Gold salts fail as arthritis remedy

PHILADELPHIA (AP) — Gold salts, a widely accepted treatment for arthritis, fails to provide long-term relief from the joint disease, a study suggests.

Patients with rheumatoid arthritis who were injected weekly with gold salts suffered disabilities and pain similar to what was felt by people who weren't injected, according to a study published in the Friday's edition of the Annals of Internal Medicine.

The researchers at the University of California, San Francisco, and Kaiser-Permanente Medical Center in Oakland, Calif., studied the course of arthritis in 574 patients for five years.

Other arthritis researchers said the study overstated the case against gold salts. They said other studies have shown the treatment effective in short-term use of under a year.

Of the 574 patients, the analysis compared 142 who were treated with gold salts for at least two years to 284 patients who received other treatment, according to the study's lead author, Dr. Wallace Epstein. The results were then statistically adjusted and showed that patients given gold salts received no benefit compared to those who did not receive that drug.

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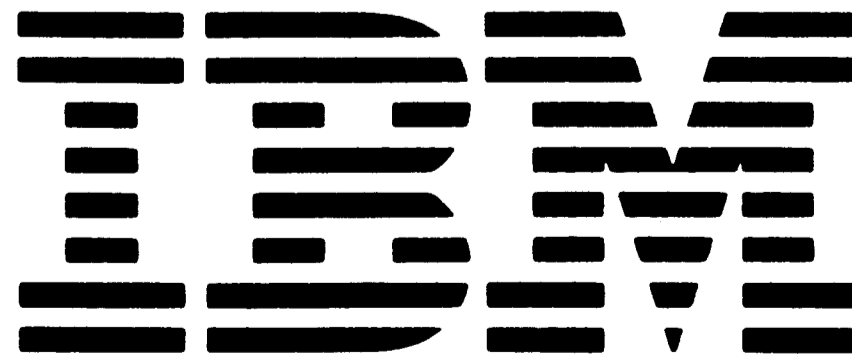
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