Left-handed excess in meteorite molecules

One of the striking features of life on Earth is the distinctive handedness of the amino acid molecules that serve as the building blocks of proteins. Although a typical amino acid exists in two molecular forms that are mirror images of each other, only the left-handed version participates in terrestrial biosynthesis.

Because chemical processes ordinarily produce a roughly equal mixture of the left- and right-handed forms of amino acids, researchers have long sought to understand whether the left-handedness of biology was simply a matter of chance or reflected the result of some sort of selection process at an early stage in the origin or evolution of life.

Now, chemists have furnished intriguing evidence that certain amino acids that formed in space 4.5 billion years ago have a small, but significant, excess of the left-handed form. John R. Cronin and Sandra Pizzarello of Arizona State University in Tempe report their findings in the Feb. 14 SCIENCE.

"This is the first convincing demonstration that there may be some natural, nonbiological process that results in a slight . . . excess of the [left-handed] amino acids," says Jeffrey L. Bada of the Scripps Institution of Oceanography in La Jolla, Calif.

The observations suggest that extraterrestrial, nonbiological organic matter could have played an essential role in the origin of life on Earth by providing the initial asymmetry from which a distinctive handedness developed, Cronin and Pizzarello contend.

Using sensitive analytical techniques, the researchers extracted and studied in meticulous detail four amino acids found in the carbon-rich Murchison meteorite, a type known as a carbonaceous chondrite. They examined amino acids that were relatively common in the meteorite but were not among the 20 amino acids found in terrestrial organisms.

By focusing on these particular amino acids, Cronin and Pizzarello could avoid problems of contamination that would bias the results. In each case, the researchers found an excess of the left-handed form of the amino acid, ranging from 2 to 9 percent.

The findings indicate that even amino acids that are never found in known lifeforms, and so could not result from terrestrial biological evolution, display a left-handed bias.

Scientists have suggested a number of mechanisms by which one form of an amino acid might be favored over its mirror image counterpart. Cronin and Pizzarello focus on the proposal that ultraviolet light, generated by a neutron star and polarized so that its electric field rotates in a particular direction, can have different effects on the synthesis or degradation of the two distinct forms of an amino acid in an interstellar cloud. Such interactions could favor the left-handed form, the researchers say.

"I find such mechanisms exotic and not very compelling," Bada remarks. "At this point, I don't think we know enough about all the possible things going on in the cosmos to make a decision on what generated the excess."

The analytical results, if verified, are bound to generate a flurry of proposals for new experiments. No one has yet looked for similar excesses in other carbonaceous chondrites. Moreover, it isn't clear whether the findings apply to the amino acids that are the constituents of proteins in terrestrial life.

At the same time, the discovery of an excess of left-handed amino acids in meteorites suggests that life's components anywhere might show the same asymmetry. That could make it more difficult to ascertain whether life arose independently elsewhere in the solar system (SN: 2/8/97, p. 87).

"If we get to Mars and find an excess of [left-handed] amino acids, we're left scratching our heads over whether this is really Martian life or some sort of contamination," Bada says. "It makes life for us more difficult." — *I. Peterson*

Advances in heart care shrink death rate

A decline in heart disease deaths since 1980, though gratifying, has confounded researchers, who find it difficult to reconcile with evidence that one in four people still smoke and many ignore other entreaties to protect their hearts.

Now, a study of coronary heart disease mortality between 1980 and 1990 shows that the death rate indeed dropped by 34 percent, say Milton C. Weinstein and his colleagues at the Harvard School of Public Health in Boston. Half of the decline resulted from treatment, including new clot-busting and cholesterol-lowering drugs, bypass surgery, artery-clearing angioplasty, and other advances.

Credit for the rest of the decline goes equally to two preventive strategies: avoiding heart disease in the first place by quitting smoking, losing weight, and lowering blood pressure and cholesterol, and reducing the risk of a second heart attack through changes in diet and lifestyle.

Taken together, improvements in treatment and prevention saved the lives of 127,000 people who would have died if the advance of coronary medicine had stopped in 1980. Of this number, the study showed, 70 percent were people who already had heart disease.

In an average year, heart attacks strike 700,000 people. Ten percent die within 24 hours, and many of the survivors face the future with a weakened heart. All told, coronary heart disease buries about 400,000 people in the United States each year, more than any other ailment.

Though bleak, these statistics nevertheless reflect a decline from heights reached in the 1960s, before health officials began publicly imploring people to guard against heart disease. Between 1970 and 1980, such efforts produced a 30 percent decline in mortality from the disease.

The death rate continued to decline through 1990, even though heart disease prevention campaigns had achieved what researchers thought would be their maximum impact. The persistence of the trend, says Thomas E. Kottke of the Mayo Clinic in Rochester, Minn., touched off a debate between the "primary, secondary, and treatment folks."

The primary prevention group linked the decline to continuing reductions in the risky behaviors that cause heart disease. Advocates of secondary prevention credited measures designed to reduce the risk of a second heart attack; the rest favored better medical care for those who already suffered from heart disease.

Weinstein and his colleagues set out to resolve this dispute. Their study, published in the Feb. 19 JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION, used a computer model to weigh factors that contributed to—or reduced—heart disease mortality among people age 35 to 84. These included heart attack rates, risk factors, and treatments.

The researchers adjusted the relative importance of all these variables until the computer model reproduced nationally tabulated death rates from coronary heart disease for 1980 and 1986. They could then use the model to generate an analysis of deaths averted through specific methods of prevention or treatment.

"We plugged in estimates of what actually occurred during the decade," Weinstein explained. The computer "played out different scenarios."

Kottke cautioned against interpreting the study to mean that technology will eventually eliminate deaths from heart attack. "There's still a significant portion of the population dead within 24 hours of a heart attack. If you're betting that the technology will be there for you, you might also wonder whether you'll be there for it." — *S. Sternberg*