Starlight Shows Life the Right Path

Once upon a time, before the birth of the sun, a nearby star-forming region contained several simple organic compounds. Some of those molecules existed in mirror-image forms. At first, there were equal amounts of the right-handed and left-handed versions.

Then some mysterious process upset the balance. One of the forms flourished while the other became rare. That seemingly innocuous turn of events may have had a profound influence on the evolution of life.

At least that's the scenario that scientists are increasingly invoking to explain a puzzling fact about life on Earth.

Although amino acids, the building blocks of proteins, and sugars, which form the backbone of DNA, can occur in both right-handed and left-handed forms, terrestrial organisms use only left-handed amino acids and right-handed sugars. A study of amino acids in the Murchison meteorite suggested that the inequality between the mirror-image forms existed before life began on Earth (SN: 2/22/97, p. 118). Astronomers have now found a possible explanation for this mystery.

Light from a star-forming cloud in the Orion nebula possesses a property that could lead to the imbalance, researchers report. Specifically, some of the light is polarized in such a way that it could enhance the population of one of the mirror-image forms of organic compounds—including those that might later be incorporated into newborn stars and planets, serving as raw material for the earliest life.

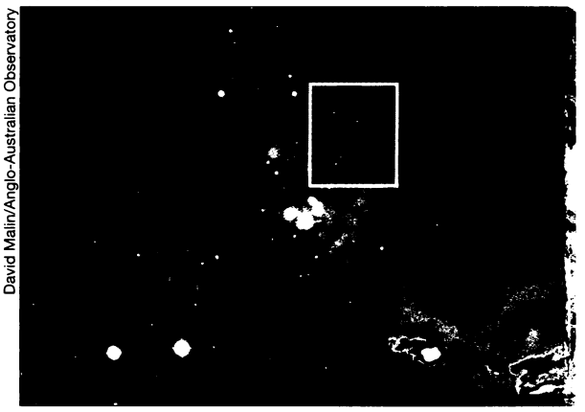
Jeremy Bailey of the Anglo-Australian Observatory in Epping, Australia, and his collaborators describe their observations in the July 31 SCIENCE.

Since dust veiling the Orion cloud absorbs both visible and ultraviolet light, the astronomers studied the infrared light emitted by the region. Using the Anglo-Australian Telescope in Coonabarabran, Australia, the team found that 17 percent of the near-infrared light is circularly polarized.

In extrapolating their observations to ultraviolet light, the high-energy radiation that can create the imbalance, Bailey and his colleagues had to assume that its spectrum in the star-forming cloud was relatively narrow. Their laboratory studies suggest that the ultraviolet light should have a circular polarization "comparable" to that of the infrared, the researchers say, but the exact percentage may differ.

A circularly polarized light wave has an electric field that rotates either clockwise or counterclockwise about the wave's direction of motion. Ultraviolet light with these types of polarization are absorbed unequally by right-handed and left-handed molecules and can break down or destroy one form more easily than the other, creating an asymmetry in the relative populations of the two forms.

Whether the imbalance generated in a star-forming cloud can be preserved many millions of year later on the surface of a chemically active planet remains to be shown, comments Jonathan I. Lunine of the University of Arizona in Tucson. Moreover, the Orion cloud may not be the type of stellar nursery in which stars like the sun can form. "But the paper's importance lies in demonstrating one natural astrophysical factor that can initiate the asymmetry," he says. —*R. Cowen*



David Malin/Anglo-Australian Observatory

White box shows the part of the Orion nebula in which astronomers found circularly polarized light. Inset shows the boxed region color-coded with red and white indicating highest polarization.

Lung cancer radiation uses questioned

A review of cancer studies over the past 30 years yields disturbing results about the use of radiation to treat some types of lung cancer.

Data from nine studies of patients with non-small-cell lung cancers show that radiation treatments after surgery actually hurt the survival chances of many patients, particularly those whose cancer hadn't spread initially. The findings appear in the July 25 LANCET.

Non-small-cell malignancies include about a dozen forms of lung cancer and account for 80 percent of cases. Of these, about a fifth are treatable with surgery, which may be followed by radiation treatment or chemotherapy.

Lesley A. Stewart of the Medical Research Council Cancer Trials Office in Cambridge, England, and her colleagues examined data on 2,128 patients in several countries. About half had been randomly assigned to receive post-operative radiotherapy. This group included some patients whose lung cancers had not spread to lymph nodes.

The survival rate 2 years after surgery was 48 percent for those getting radiation treatments and 55 percent for surgery-only patients. The sole study showing a clear benefit of radiation examined only patients with advanced cancer. The greatest detriments of radiation treatment showed up in three studies that included patients whose cancer hadn't spread to lymph nodes.

"In centers where radiotherapy might be given routinely for non-small-cell lung cancer, [doctors] may have to rethink their standard policy," says Stewart, a biologist and statistician.

Many physicians have already done so, says Allen S. Lichter, a radiation oncologist at the University of Michigan Medical Center in Ann Arbor.

"No one I know recommends radiating patients with [limited] disease," Lichter says. Instead, doctors now use radiation after surgery mainly to combat tumors that the surgeon could not reach or cancer that had spread to lymph nodes in and around the lungs, he says.

The treatments examined in the study have been modified in recent years, Lichter says. Diagnostic advances in using CT scans to pinpoint lymph node location, as well as improvements in beaming radiation accurately onto a tumor or cancerous lymph node, have greatly improved the effectiveness of radiation against lung cancer and lessened its risks. Also, Lichter notes, "we're treating smaller volumes [of tissue] in patients than we did in the past.

"I worry that a person not involved in this field might read this paper and conclude that patients with lung cancer operations should not get radiated," he says.

In a commentary accompanying the study, Alastair J. Munro of Ninewells Hospital in Dundee, Scotland, suggests that radiation doses used after lung cancer surgery "have been too high" in the past, apparently to the point of being toxic. Overtreatment can bring on radiation pneumonitis, which mimics bronchopneumonia. Deaths attributed to complications of cancer may in fact be due to the radiation, he suggests. —*N. Seppa*