

Hubble finds dark matter still a mystery

For more than 2 decades, astronomers have found evidence that at least 90 percent of the matter in the universe goes unseen. Now, findings from the Hubble Space Telescope have dashed the hopes of researchers who had suggested that this invisible material, known as dark matter, might consist simply of ordinary stars too dim for ground-based telescopes to detect.

Instead, the Hubble data uphold the prevailing view that most of the mass in the cosmos consists of exotic material totally unlike the stuff that forms stars.

Although it wasn't certain that the cosmos possessed enough dim stars to account for dark matter, the assumption seemed plausible to some astronomers. Faint stars tend to have a low mass.

And just as many more small pebbles than large rocks exist on a beach, the Milky Way contains many more low-mass stars than large, massive stars. In our stellar neighborhood, the number of faint, low-mass stars known as red dwarfs nearly equals that of all types of more massive stars put together.

Given the number of red dwarfs visible from Earth, scientists reasoned that the supply of stars lower in mass — those too faint to be seen from the ground — should be higher. These unseen dwarfs might constitute the dark matter.

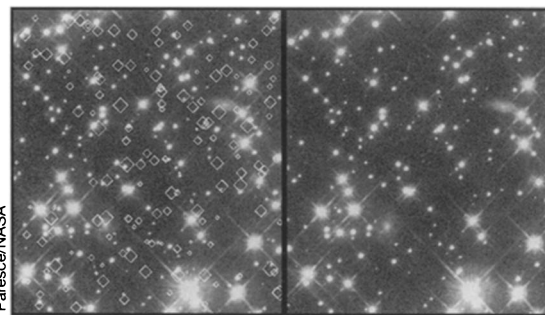
But two groups of astronomers using Hubble to search for red dwarfs 100 times dimmer than those visible from Earth found far fewer than expected. They reported their results last week at a press briefing in Washington, D.C.

One team, led by Francesco Paresce of the European Space Agency and the Space Telescope Science Institute in Baltimore, examined the globular cluster NGC 6397, a star-packed region 7,200 light-years from Earth.

"I expected to see a carpet of faint stars covering the cluster," says Paresce. "But I was astonished instead to find just a few faint stars; you could see right through the cluster."

Another group, led by John N. Bahcall of the Institute for Advanced Study in Princeton, N.J., and Andrew Gould of Ohio State University in Columbus, examined patches of the Milky Way chosen at random. It found that dim red dwarfs make up no more than 15 percent of the mass of the Milky Way's spiral disk and no more than 6 percent of the halo, the sphere of gas and stars that surrounds the disk.

The findings, Paresce says, indicate that faint red dwarfs are too scarce to account for dark matter — at least in the Milky Way. Moreover, nature seems to impose a cutoff on star formation: Stars



Right: Globular cluster NGC 6397 shows far fewer faint red dwarfs than expected. Left: Diamonds indicate the number of stars that should reside there if faint red dwarfs were abundant.

smaller than 20 percent of the mass of the sun don't seem to exist in our galaxy or perhaps anywhere else in the universe. That's a surprise, because in theory, agglomerations of gas and dust as small as 8 percent of the mass of the sun can shine as stars.

The observations don't directly exclude the possibility that dark matter may reside in brown dwarfs — proposed objects, lower in mass than red dwarfs, that don't emit light. David N. Schramm of the University of Chicago notes that some component of dark matter must take the form of ordinary matter in order to explain the abundance of light elements forged in the Big Bang.

— R. Cowen

New success with heart disease drugs

Questions about how best to fight heart disease got some answers last week, when researchers attending the annual scientific meeting of the American Heart Association in Dallas announced the results of two large drug trials.

Although many people who have had a heart attack don't get cholesterol-lowering drugs, a large, 5-year Scandinavian study finds for the first time that such medications could greatly reduce their risk of dying of heart disease.

Researchers gave 4,444 heart attack and angina patients age 35 to 70 a placebo or the drug simvastatin, reports Terje R. Pedersen of Aker Hospital in Oslo, Norway. Compared to those taking a placebo, patients on the medication had a 30 percent lower risk of dying from any cause and a 43 percent reduced chance of dying from coronary heart disease, he says. In the group taking simvastatin, 34 and 37 percent fewer needed bypass surgery or had major coronary problems, respectively.

The study "should have a major effect on the practice of medicine," says 1985 Nobel laureate Michael S. Brown, who helped determine how drugs like simvastatin work and advised the companies that developed them.

Women made up just 19 percent of the study population, too small a group to determine whether the drug prolonged their lives. But the results for women on all other measures matched those for the men, Pedersen notes.

After 6 weeks, the treatment group averaged a 38 percent drop in low-density lipoprotein (LDL) cholesterol concentration in the blood, Pedersen says. LDL deposits fats, including cholesterol, on artery walls. In the treatment group, the concentration of high-density lipoprotein (HDL) cholesterol, a measure of the amount of cholesterol being removed from the body, increased by about 8 percent.

People can improve their cholesterol counts by diet alone, but few succeed at it, the researchers note. Their study appears in the Nov. 19 LANCET.

In a related finding, a 3-year investigation of 875 postmenopausal women revealed that those who took either estrogen alone or estrogen combined with a naturally derived form of progesterone had greater increases in HDL cholesterol than those taking a placebo or those taking estrogen with a common synthetic progesterone. This is the first large-scale human trial of the natural progesterone. The participants were healthy 45- to 64-

year-olds, 90 percent of them Caucasian.

Women with the greatest rise in HDL reduced their risk of developing heart disease by 25 percent, says study team member Elizabeth L. Barrett-Connor of the University of California, San Diego, School of Medicine. All of the hormone treatments also lowered LDL.

Participants taking only estrogen had mixed results. Of the women who had a uterus, one-third developed possible precursors of endometrial cancer, says Barrett-Connor. These women were taken off the drug. However, those who continued with the treatment showed the greatest increase in HDL cholesterol.

Contrary to previous thinking, none of the hormone therapies altered blood pressure, notes Barrett-Connor. Many women fear that estrogen will cause them to gain weight, but this study seems to allay that fear. The trial did not run long enough to draw any conclusions about the risk of breast cancer posed by the drugs, she adds. The study will appear in the JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION in December.

Despite much evidence that hormone replacement therapy lowers a woman's risk of developing heart disease (SN: 4/17/93, p.246), only 15 to 30 percent of postmenopausal women take such drugs.

— T. Adler