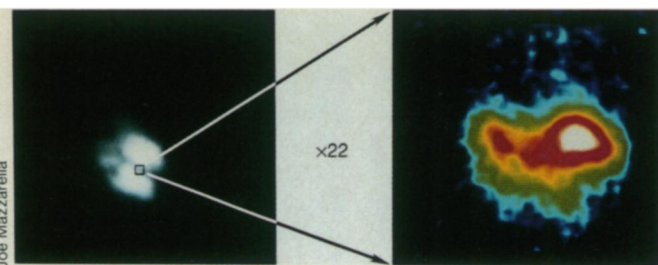


Unveiling a Galaxy's Power Source

In visible light, the galaxy Arp 220 looks unimpressive, but at infrared wavelengths it shines brighter than 100 Milky Ways. Astronomers have now identified two closely spaced sources of intense radiation buried deep within the galaxy's core. The finding suggests that Arp 220 represents a late stage in the merger of two spiral galaxies, with each galaxy having an active nucleus powered by the movement of matter toward a black hole.

"We've caught it at a unique time in its evolution, when the nuclei are very close together," says James R. Graham of the California Institute of Technology in Pasadena.

Once the obscuring dust and gas dissipate, he says, the object will likely emerge as a quasar, emitting prodigious amounts of energy at visible and ultraviolet wave-



Left: In visible light, Arp 220's central region looks like a blob split by a dust band. Right: Infrared image reveals an elongated shape, suggesting two active nuclei lie behind the dust.

lengths.

Graham and his colleagues report the unveiling of Arp 220 in the May 1 *ASTROPHYSICAL JOURNAL LETTERS*.

At a distance of 250 million light-years from Earth, Arp 220 represents the nearest example of an ultraluminous infrared galaxy. "It is of crucial importance to understand the origin, nature, and ultimate fate of the activity in the ultra-

luminous infrared galaxies because they are an important constituent of the local universe," the researchers write.

In visible light, Arp 220 appears as a blob split by a strip of dust. But images obtained at a wavelength of 2.2 microns reveal a pair of intense infrared sources hidden behind the dust.

The infrared measurements, combined with earlier radio-wave observations and the galaxy's disturbed appearance, provide convincing evidence that Arp 220 is the product of a galactic merger, the team asserts. "When you compare the radio map with the infrared map and find they are virtually identical, that clinches it," Graham says. Overall, the merged system has some of the characteristics of an elliptical galaxy.

Astronomers have now discovered close pairs of nuclei in four of the 10 known ultraluminous galaxies and have found evidence suggesting mergers in all 10. Arp 220 stands out because its two nuclei are only about 1,000 light-years apart — the smallest nuclear separation measured to date.

"What's remarkable is that the actual time the two galactic nuclei will stand at that separation is very short," Graham says. "So either we're very privileged to have caught Arp 220 at this particular stage in its evolution, or there's something we don't quite understand that maybe halts the evolution of the binary at that separation."

If black holes are indeed responsible for the observed activity, the merger will probably lead to a system consisting of two black holes orbiting each other. "If this is correct, then a black hole binary . . . may be an essential ingredient for many quasars," Graham and his co-workers contend.

According to this scenario, a galactic merger triggers the intense activity responsible for the brightness of ultraluminous galaxies by funneling gas and dust toward the system's center. With an increased fuel supply, the black holes already present in the individual galaxies grow, generating more and more power. When radiation pressure and interstellar winds finally sweep away the dust, the system emerges as a quasar. —I. Peterson

Vitamin C may reduce hypertension risk

High blood levels of vitamin C may help ward off hypertension in healthy people, two new scientific studies suggest. If confirmed, the finding will add to this vitamin's growing renown as a dietary factor that may offer protection against cardiovascular diseases.

Scientists know that vitamin C, or ascorbic acid, can disarm chemicals called free radicals that form when the body uses oxygen (SN: 8/26/89, p.133). Free radicals can damage healthy cells, including the endothelial cells that take part in artery constriction and relaxation. Some scientists speculate that such injury may lead to hypertension — a condition in which arteries remain constricted — and may initiate the buildup of artery-clogging deposits, or atherosclerosis.

Now, two research teams working independently report that vitamin C seems to play a role in keeping blood pressure healthy. Both groups presented their findings this week at the annual meeting of the American Society for Clinical Nutrition, held in Washington, D.C.

In one study, Leslie Cohen and Elaine B. Feldman at the Medical College of Georgia in Augusta and their colleagues looked at 67 healthy men and women aged 20 to 69 with normal blood pressure readings. They discovered that people in the group with the highest blood levels of ascorbic acid (about 102 micromoles per liter) had significantly lower blood pressure values than people with the lowest ascorbic acid levels (about 23 micromoles per liter). The

scientists found a mean blood pressure reading of 104/65 millimeters of mercury for high-vitamin-C participants, compared with 111/73 for low-vitamin-C participants. Feldman points out that all volunteers had ascorbic acid blood levels within the normal range and obtained their vitamin C through diet alone.

In a second report, Elaine S. K. Choi at Tufts University in Boston and her colleagues looked at 241 elderly Chinese-Americans, some of whom had high blood pressure. They found that participants with the highest blood levels of ascorbic acid tended to have the lowest blood pressure values in the group.

The new results raise the intriguing possibility that vitamin C may lower blood pressure in people with established hypertension, comments David L. Trout at the U.S. Department of Agriculture in Beltsville, Md. Trout's own study of 12 people with borderline hypertension suggests that a daily 1-gram vitamin C supplement might reduce systolic (heart-contracted) blood pressure, but this preliminary, unpublished result awaits confirmation, he says.

Choi agrees that further research is needed to establish vitamin C's ability to prevent or treat hypertension. In the meantime, she and Feldman say that adding more vitamin-C-rich vegetables and fruits to a balanced diet can't hurt. As for vitamin supplements, Feldman cautions that popping too many vitamin C tablets (more than 1 gram per day) can cause adverse side effects, including kidney stones. —K.A. Fackelmann