Astronomy

Homing in on Milky Way's black hole

New measurements that track the motion of stars closer than ever before to the center of the galaxy provide "unambiguous" evidence that the Milky Way's core contains a black hole as massive as 2.6 million suns.

Although black holes can't be seen, they reveal their presence by influencing surrounding matter. Since 1992, Andreas Eckart and his colleagues at the Max Planck Institute for Extraterrestrial Physics in Garching, Germany, have measured the velocity of some 200 stars near the galaxy's core. A special spectrometer enabled them to measure each star's motion along the line of sight, as well as across the sky.

Stars lying closest to the suspected black hole—known as Sagittarius A*—move fastest. The innermost stars that the team measured lie just 5 light-days from Sagittarius A* and whip around faster than 1,000 kilometers per second (km/sec).

The measurements suggest that an object about as massive as 2.6 million suns and denser than 2 trillion suns per cubic light-year lies at the core, Eckart reported Jan. 7 at a meeting of the American Astronomical Society in Washington, D.C. The density, he notes, is nearly a million times greater than that of the densest known star cluster. Moreover, any group of stars with that density and mass at the center of our galaxy would collapse to form a black hole after no more than a few million years. The concentration must therefore be a black hole, he reasons.

Because dust obscures visible light from the center of the galaxy, Eckart and his team made their observations at an infrared wavelength of 2 micrometers, using two telescopes at the European Southern Observatory in La Serena, Chile. Another team, which includes Andrea M. Ghez and her colleagues at the University of California, Los Angeles, observed stars at the same wavelength, but with the more powerful 10-meter W.M. Keck Telescope atop Hawaii's Mauna Kea.

In stars less than half as far from the core as those Eckart's team observed, the UCLA team measured velocities as high as 3,000 km/sec. Results of both teams agree. After 2 years of observations, Ghez and her colleagues conclude that a black hole as massive as about 2.7 million suns must reside at the core, she told SCIENCE NEWS. —*R.C.*

Planet stages a comeback

It's a planet after all.

One year ago, David F. Gray of the University of Western Ontario in London disputed the notion that the nearby, sunlike star 51 Pegasi has an unseen companion orbiting it (SN: 3/1/97, p. 133). Two teams had previously reported that certain wavelengths of light absorbed by the star shift periodically to redder and bluer wavelengths, indicating that a planet about half the mass of Jupiter is making the star wobble back and forth.

Gray, however, claimed that a more subtle feature, the shape of an absorption peak, varied along with the wavelength and that both characteristics could result only from some sort of oscillation intrinsic to the star—not from the tug of a planet.

Gray now reports in the Jan. 8 NATURE that his latest observations show no evidence of a change in the absorption peak. In light of two other reports that also find no such feature, he agrees that the signal he originally detected was probably spurious. Artie P. Hatzes, William D. Cochran, and Eric J. Bakker of the University of Texas at Austin report their findings in the same issue of NATURE. Timothy M. Brown of the National Center for Atmospheric Research in Boulder, Colo., and his colleagues, including Scott D. Horner of Pennsylvania State University in College Park, detail their results in the Feb. 10 ASTROPHYSICAL JOURNAL LETTERS.

"It's a letdown," says Gray, "that we don't really have interesting [stellar] oscillations to analyze. But what the heck, the guys who study planets will be happy." —*R.C.*

Biomedicine

Leptin: The new gut buster?

Forget about liposuction. New research suggests that the cure for a tubby tummy may be leptin, a hormone thought to play a role in regulating body fat.

Researchers have been racing to unlock leptin's secrets since its discovery in 1994 (SN: 12/3/94, p. 372). Now, endocrinologist Luciano Rossetti of the Albert Einstein College of Medicine in New York and his colleagues have published a study of rats that suggests leptin may play a role in diseases associated with a fat abdomen, the spare tire that many people develop as they grow older.

Rossetti's team gave moderately obese rats an infusion of leptin for 8 days. As expected, the rats ate less and lost weight. However, the animals lost more fat from their abdomens than from other parts of their bodies. "That was a pretty striking phenomenon," Rossetti told SCIENCE NEWS.

People with an apple-shaped body, in which fat is deposited mostly around the waist instead of on the thighs or hips, are known to run a greater risk of insulin resistance, a condition in which cells don't respond effectively to insulin's message to take up sugar from the bloodstream. People with insulin resistance, in turn, run a greater risk of developing diabetes.

In Rossetti's study, leptin significantly enhanced the effects of insulin. That finding raises the hope that leptin may help reverse insulin resistance in people and help ward off diabetes.

A potbelly is also associated with a greater risk of developing heart disease. Rossetti wonders if leptin, by selectively removing tummy fat, might ratchet down that risk as well. The team details its findings in the Dec. 15 JOURNAL OF CLINICAL INVESTIGATION. —*K.F.*

Mother's milk contains leptin

The hormone leptin, thought to control obesity in adults, may play the same role in infants. That's the speculation of researchers who have discovered leptin in human breast milk.

Karen L. Houseknecht, an endocrinologist at Purdue University in West Lafayette, Ind., and her colleagues obtained samples of blood and breast milk from 23 lactating women. They found lower concentrations of leptin in the breast milk than in the mother's bloodstream. This finding suggests that the breast itself is not making or concentrating leptin but just passing on leptin present in the bloodstream.

The team detailed its findings in a recent issue of BIOCHEMICAL AND BIOPHYSICAL RESEARCH COMMUNICATIONS. This research is only a first look at the role that leptin may play during lactation, Houseknecht says. The findings raise the question of whether leptin delivery by breast-feeding sets the stage for a child's weight regulation later in life, she adds. On the other hand, leptin in breast milk may simply represent the physiology of the nursing mother.

Since research on human newborns raises ethical questions, Houseknecht plans to continue to look for clues to leptin's role in breast milk by studying cows and their calves. —*K.F.*

Cloning debate erupts anew

The national dialogue on human cloning continued this month when President Clinton denounced a scientist's plan to clone people. The President was reacting to Chicago physicist Richard Seed's announcement that he intended to raise money for a fertility clinic that would clone people. Seed, an entrepreneur, made his comments at a December scientific meeting.

The proposal received widespread media attention after a report was aired on National Public Radio.

In his Jan. 10 radio address, Clinton urged Congress to ban the cloning of human beings for at least 5 years. The Food and Drug Administration said it is prepared to regulate human cloning research and warned that any such work done without FDA approval world be illegal. —*K.F.*