Astronomers find new member of Local Group

Dim, diminutive, and isolated, a newly discovered galaxy called Antlia doesn't look like much—which is precisely why astronomers are thrilled to have found it.

Named for the constellation in which it resides, Antlia is the newest member of the Local Group, a collection of 30 or so galaxies dominated by two massive ones—the Milky Way and Andromeda. Most of the small galaxies in the Local Group are gravitationally bound to one of these large galaxies. Antlia, in contrast, lives in isolation at the edge of the Local Group, unfettered by external gravitational influences. This nearby galaxy, which lies about 3 million light-years from the Milky Way, provides astronomers with a chance to detail how small galaxies evolve when they aren't enslaved by larger ones.

"This is an outlier, an object in the middle of nowhere that shows what happens in the absence of gravitational disruption," notes codiscoverer Michael Irwin of the Royal Greenwich Observatory in Cambridge, England.

Only one other small galaxy, a faint body called Tucana, goes it alone in the Local Group, he adds. Because of their size, shape, and featureless appearance, both galaxies are classified as dwarf spheroidals. Such galaxies have proved intriguing because they are thought to contain a much lower proportion of visible matter to dark matter—hypothetical, unseen material—than other galaxies do. In addition, several cosmological theories predict that the universe contains many more small galaxies than large ones, notes Rosemary F.G. Wyse of Johns Hopkins University in Baltimore.

Before researchers discovered Tucana a few years ago, some astronomers suggested that dwarf spheroidals were simply remnants of larger galaxies that had been ripped apart by the massive galaxies they orbited. The discovery of Antlia cements the notion that dwarf spheroidals can arise in the absence of a gravitational tussle.

Irwin, Whiting, and Hau

The Antlia galaxy (stars in both foreground and background).

Irwin and his colleagues, Alan Whiting and George Hau of the University of Cambridge, reported their findings this week in Southampton, England, at the Royal Astronomical Society's annual National Astronomy Meeting. They identified Antlia, as well as another dwarf galaxy, Argo, which lies a little too far away to qualify as a member of the Local Group, by searching 894 survey photographs of the southern sky. Computer analysis then homed in on the most likely candidates among the several dim, diffuse objects detected, and observations last month with the 1.5-meter telescope at the Cerro Tololo Inter-American Observatory in La Serena, Chile, revealed the two to be nearby galaxies.

Antlia's status as an outlier offers another benefit, Irwin notes. As a way of estimating the age of the universe without measuring the cosmological rate of expansion, researchers can take the current positions, velocities, and masses of members of the Local Group and turn the clock backward, calculating the time of the Big Bang as the moment when all the galaxies would have overlapped. Because Antlia hasn't interacted with other Local Group members, its prior motion can be reconstructed more accurately, Irwin says. *— R. Cowen*

Solar cells may sub for retinal receptors

Researchers in Germany are developing an eye implant, based on a solar cell, for people who have lost their sight because of a disease of the retina.

The implant, just 1.5 micrometers thick and about 3 millimeters in diameter, "is not giant in size or market value, but giant in its goals," says Markus Schubert of the University of Stuttgart. He described the device last week in San Francisco at a meeting of the Materials Research Society.

Schubert and his colleagues are testing how animals tolerate the implant. A host of technical issues must be resolved before the device can be used in people.

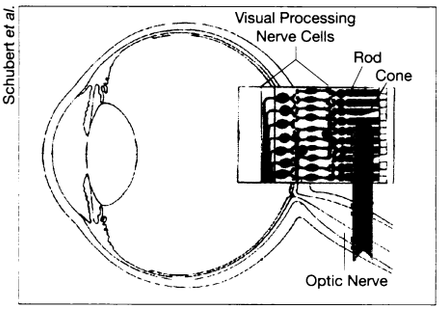
Several groups of researchers are investigating retinal implants as a way of restoring partial sight to people with retinitis pigmentosa. This disease causes the light-sensitive rod and cone cells in the retina to waste away, producing tunnel vision or total blindness. About 20,000 people in the United States are blind because of retinitis pigmentosa.

The German team's implant consists of a thin layer of amorphous silicon deposited on a flexible titanium film and etched with an array of light-sensitive elements that turn light into electric impulses. Instead of converting light into electric power, however, the implant creates signals that are picked up by nerve cells in the retina. Those impulses then travel via the optic nerve to the brain.

Unlike other groups, the German researchers are designing their device to be implanted within the retina, where the rods and cones normally reside, rather than on its front surface. "It's a more direct approach," Schubert says. Their implant delivers signals to the first links in the chain of nerve connections leading from the eye to the brain and makes use of retinal nerve cells' ability to process those signals.

Implants on the surface of the retina, in contrast, convey information to nerve cells that are nearby but further along in the chain. This approach requires complicated preprocessing of the data, he says.

Schubert *et al.*

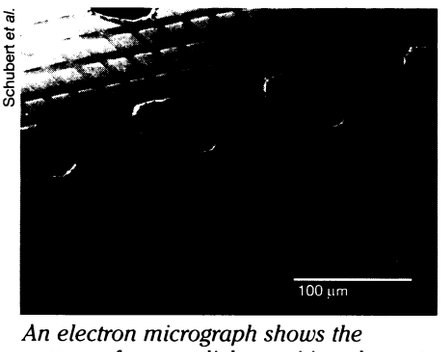


The new implant would replace degenerated rod and cone cells, located at the back of the retina.

Mark S. Humayun of Johns Hopkins University in Baltimore argues that implants on the retinal surface do not necessarily call for more data processing and would be easier to implant and remove. Recent experiments by his group suggest that the form of the electric impulses, rather than physical proximity, determines which nerve cells are stimulated. Retinal surface signals could therefore trigger the earliest steps of visual processing.

"It's like tuning in a radio station," he explains. "It depends on the frequency, not how close the radio is to where the station is broadcast." *— C. Wu*

Schubert *et al.*



An electron micrograph shows the pattern of square, light-sensitive elements on the retinal implant. The round holes allow nutrients to reach the retina.