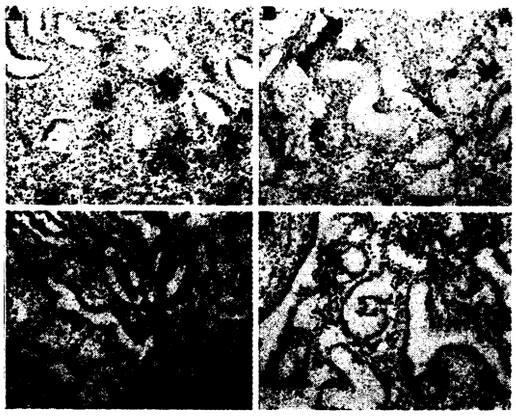


B. A. Lessey

Brown staining represents beta-3; green staining represents absence of beta-3. (A) to (C) show the epithelial cells of a woman without endometriosis: (A) proliferative phase, (B) early secretory phase, day 18, and (C) midsecretory phase, day 22. (D) shows a woman with endometriosis; there is no epithelial staining for beta-3.

However, the team notes, "Not all patients subsequently found to have endometriosis were missing the beta-3 subunit."

Scientists have no clear understanding of how the egg implants in the uterine wall or beta-3's function in that process, though Lessey believes the protein is indeed involved in implantation. However, he cautions that the process isn't simple: Infertility doesn't result solely from an absence of beta-3. "Implantation might be a cascade of molecular events."

Even so, Lessey and his colleagues hope that using beta-3 deficiency as a marker will soon lead to the development of "a cheap and easy test" to diagnose endometriosis. This will reduce the need for laparoscopy, which requires a general anesthetic. A biopsy can be performed in a doctor's office in a few minutes at a fraction of the cost of surgery.

Christos Coutifaris of the University of Pennsylvania Medical Center in Philadelphia calls the findings encouraging, but he remains cautious about making clinical generalizations based upon them. "The patient population he [Lessey] studied is extremely skewed toward endometriosis," he says.

Coutifaris also expresses concern that the 86 percent success rate of beta-3 noted in the study resulted from such a small number of women. "This study, in terms of becoming a valid clinical tool, needs higher numbers," he says. "Take all patients coming into an infertility clinic and get 200 controls and 200 cases."

"However, this study gives us good reason to design a multicenter study," Coutifaris adds. "The data are limited, but they're very exciting." Adds Luigi Mastroianni Jr., also from the University of Pennsylvania, "This opens the window for a glimmer of understanding of how endometriosis affects fertility. I'm sure it will be pursued." *– G. Marino*

Light halo hints at a galaxy's dark matter

There's far more to the cosmos than meets the eye. Astronomers have known for decades that visible matter alone can't account for the rapid rotation of stars in a galaxy or provide the gravitational glue that keeps galaxies bound in a cluster.

Now, a faint halo of light detected from a nearby galaxy is providing astronomers with a new window on some of the missing material – dark matter thought to account for at least 90 percent of the mass of the universe.

The halo, which surrounds the spiral galaxy NGC 5907 in the direction of the constellation Draco, averages only one-hundredth the brightness of the night sky and requires one of the largest solid-state detectors available in order to be seen.

But its extreme dimness isn't what intrigued a team of astronomers that includes Penny D. Sackett of the Institute for Advanced Study in Princeton, N.J., and Heather L. Morrison of the National Optical Astronomy Observatories in Tucson. They found that the surface brightness of the halo, measured from its center to its visible edge, declines far more gradually than the more luminous halos observed around many other galaxies.

The gradual decline in light doesn't match the distribution of visible matter in the spiral disk of NGC 5907. Instead, it appears to match the distribution of dark matter that several other astronomers have calculated should reside throughout the visible disk and beyond. Sackett, Morrison, and their colleagues report their work in the Aug. 11 NATURE.

"The researchers have described compelling evidence that a component of optical light has the same distribution as the dark matter inferred from the dynamics of the galaxy," comments Leonard Searle of the Carnegie Observatories in Pasadena, Calif.

"This [faint glow] is what we had been hoping would show up for two decades, and we've finally had the technology to detect it," adds Vera C. Rubin of the Carnegie Institution of Washington.

Rubin and other researchers gathered evidence more than 2 decades ago that the visible stars equal a mere fraction of the total amount of mass in galaxies. They observed that stars in spiral galaxies like the Milky Way move at a constant speed – regardless of whether they lie near the center or the outskirts of those galaxies.

Such behavior is a dead giveaway that the visible disk of these galaxies lies embedded in a much larger and more massive halo of unseen material. If it weren't, stars farther from the galaxy's center would experience a smaller gravitational tug and move more slowly.

The marked discrepancy between the amount of visible matter in NGC 5907 and the rotation rate of its stars provided astronomers with a promising location for a telltale halo, Rubin notes. But with only one such halo observed, it remains unclear whether the phenomenon is unique to NGC 5907 or is a general property of other spiral galaxies, she cautions.

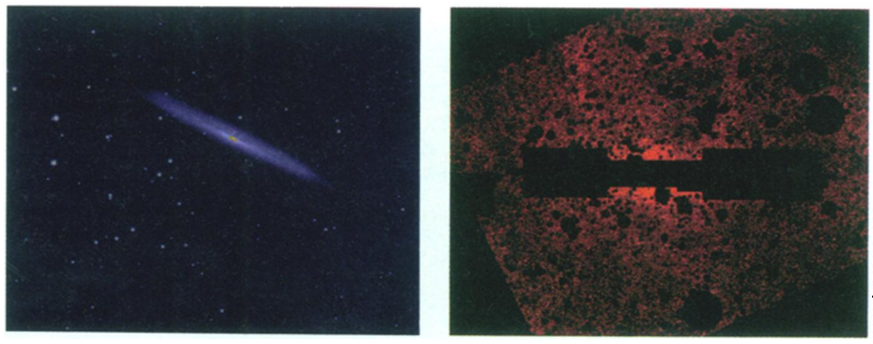
Until researchers can complete observations at several wavelengths, they offer two explanations for the faint halo: The stars that emit the faint glow either trace the distribution of dark matter or make up the dark matter itself.

For the latter scenario to hold true, the halo stars would barely shine and could have a mass no larger than one-tenth that of the sun. Astronomers have inferred the existence of a few such objects in the Milky Way (SN: 9/25/93, p.199), but the number in NGC 5907 would have to be far greater, Sackett notes.

If the halo stars are dark-matter tracers, they would have a more normal mix of masses. But why should these stars trace the unseen matter?

Sackett suggests that they are elderly stars that formed early in the history of the universe, just as dark matter had settled in but before the onset of the violent events thought to have shaped the brighter, visible portions of the galaxy.

– R. Cowen



Sackett *et al.*/NOAO

Left: The halo can't be seen in this image of the galaxy NGC 5907. Right: To make the halo visible in this false-color image of NGC 5907, astronomers subtracted the light estimated to come from the galaxy's disk. The halo actually extends to the core of the galaxy, but researchers masked that region to minimize errors in the appearance of the halo.