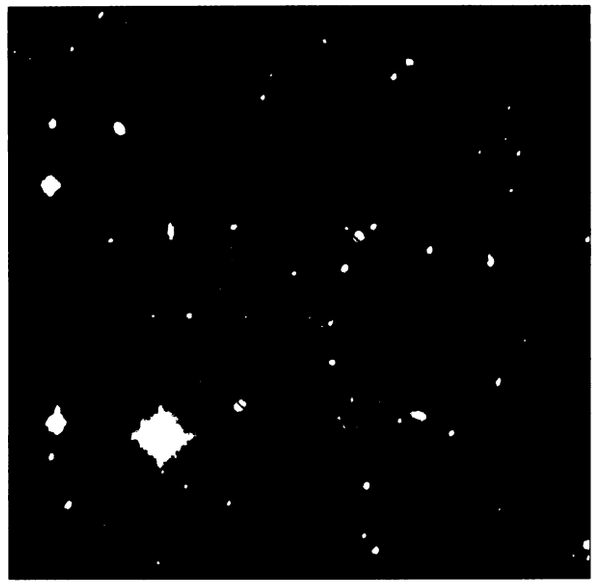
sive gravitationally bound systems in the universe. They hope to determine, for example, when different types of galaxies first began to form and whether large elliptical galaxies were scarcer in clusters early in the universe than they are now. If they were, it may suggest that the elliptical galaxies formed when smaller galaxies collided.

Meghan Gray, also of Cambridge, is using CIRSI to hunt dark matter, the invisible material believed to account for more than 90 percent of the universe's mass. Dark matter can be detected only through its gravity.

In their study, Gray and her collaborators take advantage of a cosmic illusion. According to Einstein's theory of gravitation, large clumps of matter, whether dark or visible, can act as lenses by bending and magnifying light from distant galaxies that lie directly behind them. The more massive the clump, the greater the magnification.



Ringed region shows an X ray–emitting cluster of galaxies, nearly halfway to the edge of the observable universe, seen with the new near-infrared detector on the Isaac Newton Telescope.

By studying the extent to which nearby clusters of galaxies magnify light from distant, infrared-bright galaxies, the astronomers plan to weigh the total amount of matter—both visible and dark—in the nearby clusters.

For researchers who wish to explore the nearby universe, the camera provides a new tool for finding cool objects, which emit most of their light in the near-infrared. These include very cold white dwarfs—the dying embers of stars like the sun—as well as low-mass stars, extrasolar planets, and brown dwarfs.

Instead of looking for lone brown dwarfs, McMahon's team plans to search for ones with a partner, either a star or another dwarf. Scanning a cluster of stars known as NGC 6633 for brown dwarfs locked in a gravitational pas de deux, the astronomers intend to measure how rapidly each dwarf orbits its companion and how far away the companion lies. From these measurements, the researchers hope to deduce the masses of these enigmatic objects.

McMahon continues to frequent Mauna Kea. But these days the frustration is gone—he goes there mainly to take close-up images and spectra of the trove of objects he's already cataloged. To mine large patches of sky in the near-infrared, he travels to another site, nearly halfway around the world—the Isaac Newton Telescope. He's got his own camera there ready to explore a new vista of the universe. □

Biology

Chlamydia protein mimics heart muscle

An attempt to unravel how certain viral infections harm the heart may have produced an explanation for the tantalizing link between some bacteria and the development of heart disease. What researchers have stumbled upon is in essence a dangerous case of mistaken identity.

Josef M. Penninger of the Amgen Institute in Toronto and his colleagues have been studying how infections by members of the coxsackie virus family stimulate an animal's immune system to attack its heart. The researchers found that injections of a small fragment of the heart-muscle protein myosin generated heart damage nearly identical to that caused by the viruses. They therefore wondered whether the viruses have proteins structurally similar to the myosin fragment. Such molecular mimicry could explain why the immune system responds to the microbes by attacking the heart.

Yet when Penninger's team searched a database of viral and bacterial proteins, the only match to the myosin fragment was part of a surface molecule made by the bacterium *Chlamydia trachomatis*. That match intrigued Penninger because another member of the chlamydia family, *Chlamydia pneumoniae*, has been associated with heart disease (SN: 6/14/97, p. 375). A recent study even suggested that antibiotics might prevent the development of heart attacks (SN: 2/6/99, p. 86).

Penninger found that *C. pneumoniae* has a surface molecule identical to the one in *C. trachomatis* that mimics myosin. He and his colleagues even showed that injections of this bacterial protein have a dramatic effect. "We can take a piece of the bacteria, put it into [mice], and give them heart disease," says Penninger. He argues that his group has offered the first proof of a mechanism by which chlamydia bacteria may trigger heart problems.

Epidemiology studies, however, have linked the bacteria to atherosclerosis, a thickening of blood vessel walls, not to a direct immune attack on the heart, comments J. Thomas Grayston of the University of Washington in Seattle. Grayston, who was one of the first scientists to connect *C. pneumoniae* to heart disease, notes that at least two other theories have been put forth to explain how the bacteria induce heart disease. "There has been lots of speculation about what the mechanism might be," he says. —*J.T.*

The sweet smell of serum

You smell. Don't worry, we all do. In fact, studies indicate that every animal has a distinctive smell, a so-called odortype. Moreover, research suggests that rodents, and even people, prefer a mate with a different smell, perhaps as a way of ensuring genetic variability within a population. A study now reports that these identifying odors circulate in the blood, although they're apparently bound to proteins that normally mask the smell.

Much of the research on odortypes has focused on the ability of mice to identify the smell of urine from different mice. Since urine is a complex liquid, scientists haven't had much success identifying the specific odor molecules recognized by mice. Suspecting that serum, the fluid portion of blood, might also carry the odorants, investigators tested whether mice can discriminate among blood samples. They couldn't.

The odor molecules, however, may be bound to other proteins circulating in serum and are freed only when processed by the kidney into urine, says Kunio Yamazaki of the Monell Chemical Senses Center in Philadelphia. In the Feb. 16 PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES, he and his colleagues show that mice can indeed discriminate among serum samples—nearly as well as among urine samples—if the liquid is first treated with a protease. This enzyme, which breaks down proteins, apparently frees the odorants, says Yamazaki. —*J.T.*