defective tau could alter signaling cascades leading to oxidative damage or apoptosis.

If the neural decay seen in the altered fruit flies does turn out to resemble that in human dementias, the fly model should help researchers work out just how tau causes neuronal death. Because flies carrying the mutant human *tau* gene have visibly altered eyes, it will now be easy to create and screen thousands of mutant flies to help uncover those genes whose protein products either boost or block tau's effects. That, in turn, could offer novel targets for drugs that keep neurons from derailing, which could lead to new treatments for human dementias. **–DAN FERBER**

ESPIONAGE CASE

Japan Says Cell Lines Weren't Used at RIKEN

TOKYO—The strange case of the Japanese researcher accused of taking biological materials he developed at the Cleveland Clinic Foundation in Ohio to his new job at Japan's Institute of Physical and Chemical Research (RIKEN) took another odd twist last week. RIKEN officials reported that investigators can find no evidence that the materials were ever used in experiments at its Brain Science Institute, although some of the materials may have been temporarily stored in neuroscientist Takashi Okamoto's RIKEN lab.

Memory loss. RIKEN's Akira Kira, second from left, and other officials report on allegedly stolen Alzheimer's research materials.

RIKEN launched the investigation after U.S. officials claimed that Okamoto had stolen cell lines and DNA samples from the Cleveland Clinic (*Science*, 18 May, p. 1274). In early May, a U.S. grand jury indicted Okamoto—who worked on Alzheimer's disease at the Cleveland Clinic from 1997 to 1999—and Hiroaki Serizawa, a researcher at the University of Kansas Medical Center in Kansas City, on charges of conspiring to steal trade secrets for the benefit of a foreign government. RIKEN is technically a nonprofit corporation but is funded by Japan's government. The charges surprised many researchers, who say that scientists often take materials they have developed with them to their new jobs.

A six-member team of scientists drawn from RIKEN and outside institutes traced the sources of all 194 samples of DNA, cell lines, and reagents that Okamoto's team had used in his RIKEN lab. The team also asked other RIKEN research groups if they had acquired any material from Okamoto. "We have never used any material [from the Cleveland Clinic] in experiments at RIKEN," concluded Akira Kira, a RIKEN vice president who led the investigation.

But the investigation turned up a new wrinkle. While he was still in Ohio, Okamoto allegedly shipped some biological material from the Cleveland Clinic to a researcher working at another institute in Japan. That researcher later joined Okamoto's team at RIKEN and brought the material with him. But the researcher told RIKEN investigators that the samples later disappeared from a laboratory refrigerator. The investigators believe that Okamoto e-mailed another RIKEN scientist asking about the possibility of sending materials from Ohio to RIKEN for storage.

Okamoto has been on leave and incommunicado since the indictment. Serizawa has asked for a delay in his trial, scheduled to begin next month. **–DENNIS NORMILE**

ASTRONOMY

Infrared Gleam Stamps Brown Dwarfs as Stars

PASADENA, CALIFORNIA—Once upon a time, a star was a star and a planet was a planet and never the twain would meet. But times have changed. Try making a statement like that today, and even polite astronomers will roll their eyes at your naivete and sigh nostalgically.

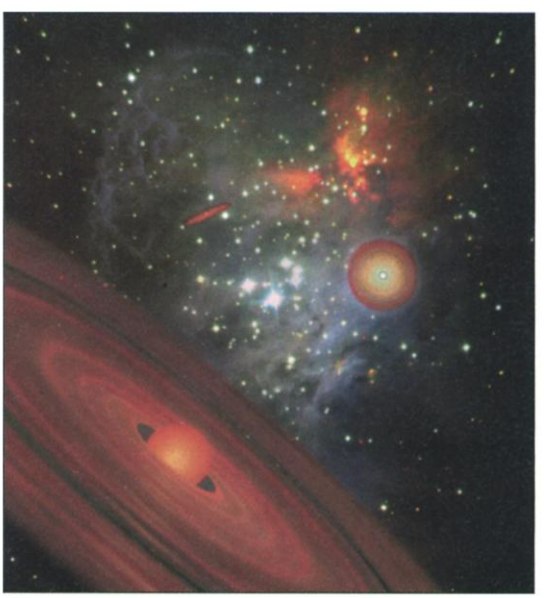
Their concern is with a misfit class of gaseous balls recently discovered orbiting nearby stars or floating freely through space. It's hard to know how they formed: They seem too heavy to have developed from the slow agglomeration of material, like jumbo-sized planets such as Jupiter. Yet they are too light to ignite the nuclear fusion that powers stars. Confused astronomers named the objects failed stars, superplanets, or the noncommittal brown dwarfs.

But now, the surprisingly bright infrared light from 63 brown dwarfs in the nearby Trapezium star cluster is helping make the case that the free-floating brown dwarfs are failed stars and not stray planets, astronomers told the American Astronomical Society here on 7 June.*

Traditionally, stars and planets are easy to distinguish. Stars weigh more than seven times as much as Jupiter—the threshold mass for nuclear fusion—and form out of a collapsing cloud of cold molecular gas. Any leftover gas then swirls into a protoplanetary disk around the newborn star. Planets, on the other hand, weigh less than seven Jupiter masses and, according to the most popular theory, form by scavenging rock and gas from the disk.

Several discoveries in the past 5 years have called this simple picture into question. Moving up from the planetary end of the mass range, several teams have identified 67 planets orbiting nearby stars. These exoplanets weigh up to 17 times the mass of Jupiter. And dropping down from stellar masses, astronomers have discovered almost 200 objects floating freely like stars in the Milky Way that weigh as little as 10 Jupiter masses (*Science*, 6 October 2000, p. 26). So which are the stars and which are the planets?

At least part of the question has now been answered: The free-floating brown dwarfs form like stars. Although brown dwarfs have no nuclear fire in their belly, they are hot enough to emit infrared radiation, just like a human body. And if they formed from contracted clouds like a star, a warm, dusty disk should orbit the dwarf and radiate additional infrared light. It was precisely this extra light that astrophysicist Charles Lada of the Harvard-Smithsonian Center for Astrophysics in Cambridge, Massachusetts, was looking for when his team surveyed 100 brown dwarfs in the nearby Trapezium cluster, a stellar nursery in the constellation Orion. The search, conducted in March 2000 with the 3.5-meter New Technology Telescope in Chile, was a success: 63 dwarfs showed evidence of disks. An oversized free-



Worlds apart. Evidence of protoplanetary disks shows that lone brown dwarfs form like stars, not planets.

CREDITS: (TOP TO BOTTOM) DENNIS NORMILE; B. SCOTT KAHLER/HARVARD-SMITHSONIAN CENTER FOR ASTROPHYSICS

* 198th meeting, 3 to 7 June.

floating planet formed by agglomeration would not have a disk, Lada explains, so these dwarfs must have formed the way stars do. The disks could even spawn small inhospitable planets, Lada says.

"This is compelling evidence," says Geoff Marcy, an astronomer at the University of California, Berkeley. Although he is confident that the disks are real, Marcy points out that astronomers' models of brown dwarfs are still in their infancy, so it's hard to predict exactly how much infrared radiation dwarfs should produce. Better models should soon reduce that uncertainty, he says.

–MARK SINCELL

Mark Sincell is a science writer in Houston.

ASTROPHYSICS

Quasars or Blazars? It's All in the Angle

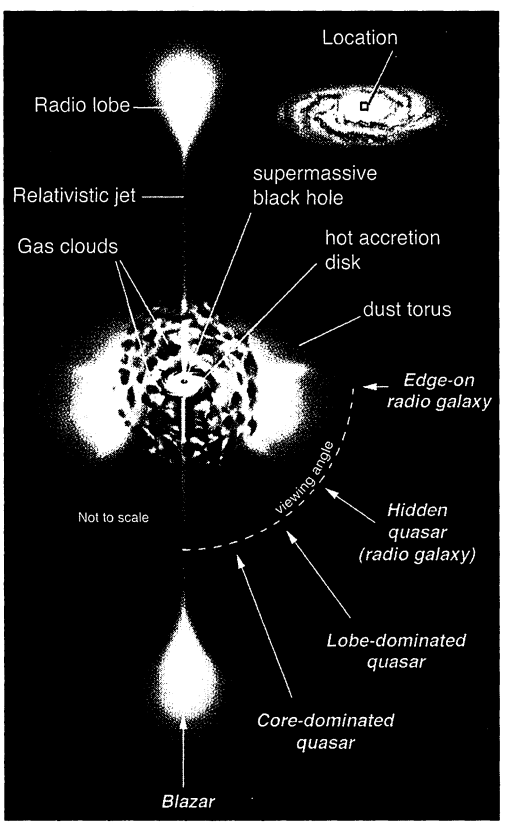
If you had never seen a peacock and then suddenly stumbled across a pair of them—one strutting past in profile, the other facing you in full display—you might think you were looking at two different animals. Astronomers suspect they've been making a similar mistake. New observations strongly suggest that a wide variety of extragalactic objects are actually the same cosmic animal seen from different angles.

The objects in question are blazars, quasars, and radio galaxies. Astronomers think that all are variations on a theme: distant galaxies, each revolving around a nucleus in which a supermassive black hole slowly consumes a hot accretion disk of swirling gas and spews some of it out in powerful jets. Blazars are extremely luminous, highly variable sources of radiation. Quasars are less energetic and steadier, and the ones that emit radio waves come in two varieties. In one case, most of the radio waves come from the quasar's bright core; in the other, most are emitted by two lobes on opposite sides of the galaxy. Finally, the objects known as radio galaxies sport two radio lobes but show no core activity at all.

Over the past 15 years or so, astronomers have suggested different models to describe this bewildering variety of active galaxies. The most radical proposal came from Peter Barthel of the University of Groningen in the Netherlands, who suggested that every radio galaxy is really a quasar seen edge on, its bright core hidden by a torus of dust.

Klaus Meisenheimer of the Max Planck Institute for Astronomy in Heidelberg, Germany, disliked that idea. "I couldn't believe that a quasar could be hidden from view so completely," he says. Using the European Infrared Space Observatory (ISO) satellite, Meisenheimer set out to disprove it. If a dust torus were absorbing radiation from the central quasar, he reasoned, it would reemit the energy as infrared light. So if Barthel were right, radio galaxies and quasars should look the same to ISO. In a paper accepted for publication in *Astronomy & Astrophysics*, Meisenheimer and his colleagues report that that is exactly what they found. "I was really astonished," he says. "I'm [now] convinced that the unification scheme is in principle correct."

Meanwhile, Feng Ma and Beverley Wills of the University of Texas, Austin, were working on what Ma calls "the other end of the unification scheme": the idea that a blazar is just a radio-emitting quasar with one of its jets pointing straight at Earth. On page 2050, Ma and Wills describe how they used a sensitive spectrograph at the 2.7-meter Harlan J. Smith Telescope at McDonald Observatory in Texas to study light emitted by ionized carbon and hydrogen atoms in gas clouds close to the cores of 62 quasars. The emissions are powered by radiation from the quasars.



Slanted story. Seemingly diverse astronomical objects may be different views of galactic cores.

ILLUSTRATION: C. SLAYDEN

Comparing their measurements with readings taken over the past 20 years, Ma and Wills found that in many cases the relative strength of the carbon and hydrogen emissions shows large variations, indicating that the central source varies as much as a blazar does. Their conclusion: There's really no difference between radio-emitting quasars and blazars. Blazars look more volatile and variable only because astronomers are viewing their jets head on. "There's a blazar hidden in every radio-loud quasar," says Ma.

Barthel says he is delighted with the new results, particularly those of Ma and Wills. The ISO data are less convincing, he says, because in many cases Meisenheimer's group could not detect any infrared radiation from the sources they studied. Working with his graduate student Ilse van Bemmel, Barthel has made more-sensitive observations indicating that quasars seem to be on average a little bit brighter in the infrared than radio galaxies. "But this can easily be explained by assuming certain properties for the obscuring dust torus," he says.

Meisenheimer acknowledges that his results are tentative. "But this is so different from what I had expected that I'm convinced," he says. And with new evidence for the unification scheme arriving almost weekly, there seems little doubt that all radio-emitting active galaxies are equal—although some of the cosmic peacocks hide their dazzling tails. –GOVERT SCHILLING

Govert Schilling is an astronomy writer in Utrecht, the Netherlands.

ANIMAL MODELS

EC Boosts Funds for Mutant Mice

The European Commission (EC) has awarded a $3.8 million grant to a "virtual archive" of mutant mice used in research on cancer and a variety of other human diseases. Announced at an 11 June press conference in Rome, the award will go to the European Mouse Mutant Archive (EMMA), a consortium of European institutes that create and store mutant mice and their frozen embryos. The money comes from a special $21 million fund created last year by EC research commissioner Philippe Busquin to support bioinformatics and animal model research. Just over half of these earmarked funds were awarded last month to the European Bioinformatics Institute near Cambridge, U.K. (*Science*, 18 May, p. 1275). "The idea is to take programs that are working well and ensure that they are operating at the maximum possible level," Busquin told *Science*.

The new funds will help EMMA—which is headquartered at Monterotondo, outside Rome, and coordinates the activities of institutes from seven European countries—to keep up with the ever-increasing demands for mutant mice, whose altered genomes can