Tracking the Roots of Parkinson's Disease

Scientists have, for the first time, observed brain damage characteristic of Parkinson's disease in individuals without any symptoms of the disorder, but who have been exposed to a cell-damaging substance—in this case, synthetic heroin. The finding suggests that exposure to similar toxic substances may predispose people to develop Parkinson's disease later in life when additional brain cell loss occurs as a result of aging, according to study director Donald B. Calne of the University of British Columbia in Vancouver.

"This work is pointing the way toward an early diagnostic test for Parkinson's disease," says psychiatrist Solomon H. Snyder of Johns Hopkins University in Baltimore.

Adds J. William Langston of Stanford University, who also worked on the project, "Ultimately, the most exciting thing is that we can now proceed with research strategies to prevent Parkinson's disease."

For more than a century, physicians have been baffled by Parkinson's disease. It usually occurs among older people and is marked by tremor, muscle rigidity and weakness and a shuffling gait. Approximately 400,000 individuals in the United States have the disorder, which stems from the loss of dopamine cells in the area of the brain known as the substantia nigra. Medications that stimulate dopamine production are used to ease symptoms, but origins of the disorder have eluded researchers. Studies of identical twins show that the illness has a weak genetic component, says Calne.

But positron emission tomography (PET) scans show a significant decline in the formation and retention of critically located dopamine neurons among four users of synthetic heroin, report Calne and his co-workers in the Sept. 19 NATURE. The substance, a so-called "designer drug" brewed from several readily available chemicals, contains a byproduct called MPTP that causes parkinsonian symptoms and selective destruction of dopamine cells in monkeys. The synthetic heroin users had no symptoms of Parkinson's disease, but damage to their brain cells fell in between that recorded for seven healthy subjects and six patients with the full-blown disorder, none of whom had been exposed to MPTP.

Calne and Langston say this supports their contention that there is a one-two punch in the development of Parkinson's disease. Environmental hazards first cause "clinically silent damage" to the substantia nigra, they maintain, followed by normal cell loss with aging that promotes progressively worse symptoms.

Over 400 synthetic heroin users exposed to MPTP have been identified in California, where the research subjects were recruited. Recently, young people who first used MPTP two years ago have begun to develop symptoms of early parkinsonism, according to Robert J. Roberton, chief of California's Division of Drug Programs in Sacramento. "We may be facing an epidemic of Parkinson's disease among young adults in northern California [as a result of MPTP use]," he says.

Several chemicals in the pyridine group are similar in structure to MPTP and exist in the environment, especially in foods, write Snyder and Robert J. D'Amato of Hopkins in an editorial accompanying the NATURE article. One of these is found in peppermint, spearmint and tea and produces a depletion of dopamine-related chemical markers in mice. "No one has ever looked closely for MPTP-like pyridines in foods," says Langston. "We should chase this lead aggressively." The prevalence of Parkinson's disease is much lower in China and Japan than in Europe and the United States, adds Calne, and may be related to cultural differences in diet. Some viruses may also contribute to dopamine cell depletion, he says.

Parkinson's research, stalled for so long, has been boosted by the PET data, says Langston. He plans to study patients in the early stages of the disorder treated with drugs that block the action of an enzyme crucial to MPTP's toxicity. Drugs that block MPTP accumulation through the brain's dopamine uptake system may also be studied, says Snyder.

Notes Langston, "It's not so futuristic anymore to talk about preventive strategies for Parkinson's disease." —*B. Bower*

X-ray 'ridge' in galactic center

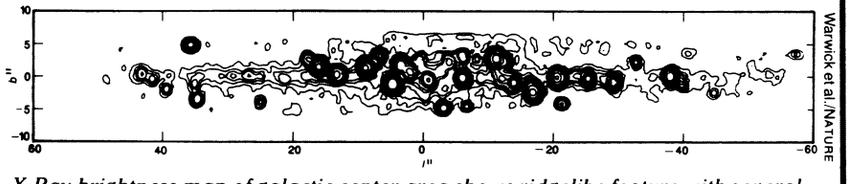
The more ways astronomers look at the center of our galaxy the more curious things they find. This time, an X-ray survey of the center of the galaxy using the satellite Exosat has found a mysterious "ridge" of X-ray emissions stretching for 40° on each side of the galactic center, two ninths of the way around the sky. According to the observers, R.S. Warwick, M.J.L. Turner, M.G. Watson and R. Willingale of the University of Leicester in England, this is the first survey of the X-ray emissions of the galactic center region. Previous X-ray observations with the HEAO-1 satellite were unable to get data on this area.

HEAO-1 did find similar ridgelike emissions along the galactic plane at galactic longitudes greater than 50°. (Galactic longitude is counted from the center of the galaxy, which is longitude 0°.) One of the people involved with the HEAO-1 work, Diana Worrall of the Harvard-Smithsonian Center for Astrophysics in Cambridge, Mass., says therefore that she is not surprised that the Leicester group has found what they did. She suggests that the ridgelike features at large galactic longitudes may be extensions of this central piece.

The central ridge is quite narrow. At its ends it extends over only about 2° of galactic latitude, but in the center it bulges to cover about 10° of galactic latitude. (Zero galactic latitude is the plane in which most of the galaxy lies.) Thus the X-ray ridge bulges in just the region where the galaxy bulges out from its central plane.

Worrall says the Leicester group's work is "a nice measurement" by which astrophysicists can test their models of what is there. At the moment the origin of the ridgelike emissions is very much a mystery. In their paper in the Sept. 19 NATURE reporting the discovery, the Leicester observers consider a few possibilities. One way such a ridgelike appearance could arise is from the overlapping of emissions by a large number of compact discrete sources that the observing equipment is unable to resolve separately. If this is the case, however, the individual sources have to be quite faint, emitting less than $10^{33.5}$ ergs per second each. Another possibility is that the source itself is diffuse, some kind of hot, possibly ionized, gas, but such a gas would be hard to confine in the galactic plane by either gravity or pressure, the Leicester group calculates.

—*D.E. Thomsen*



X-Ray brightness map of galactic center area shows ridgelike feature with several compact discrete X-ray sources superimposed. Lines are X-ray brightness contours. Galactic longitude is measured along horizontal axis, galactic latitude along vertical.