

'Genetic Depression' and 'Viral Schizophrenia'

Despite some major problems in defining exactly what schizophrenia is (SN: 9/30/78, p. 230), psychiatrists generally agree that the disorder in many cases has a genetic component. Much of that theory's supportive evidence has come from studies of adoptees, especially the well-known research conducted in Denmark by Harvard University psychiatrist Seymour S. Kety. In work begun in 1962, Kety and his colleagues have examined the biological background of 33 schizophrenics from among the more than 5,000-person Greater Copenhagen sample. The researchers have found that the rate of schizophrenia among the biological parents, siblings and half-siblings of the schizophrenics is nearly four times that of the biological relatives of a matched control group and about five times that of the schizophrenics' adopted families.

Still, the biological relatives of about half of those adoptees diagnosed as schizophrenics show no history of schizophrenia. This means, Kety says, "there must be two forms of schizophrenia: that which is primarily genetic and that which is primarily environmental." At a recent American Psychiatric Association research symposium in Snowmass, Colo., Kety discussed the latest Denmark findings on environmental aspects of schizophrenia and presented still-unpublished data on possible genetic factors in depression.

In a study similar to the work with schizophrenics, a group of 85 adoptees with affective disorder — primarily depression — was found to have a "significant concentration" of depression among biological relatives, Kety reported. The apparent genetic factor in depression is "not as strong as in schizophrenia," but is still three times stronger in biological relatives of depressed persons than in their adopted families, he told SCIENCE NEWS. Of the 18 suicides that occurred among the biological relatives of depressives and controls in the study, 15 were among the relatives in the depressed group, indicating a "genetic factor in suicide," Kety says. "There may be a genetic predisposition [to suicide] among those exposed to certain life situations," he suggests.

But there also appear to be strong "environmental factors at work" in both depression and schizophrenia. UCLA psychologist Dennis K. Kinney found "low genetic risk," schizophrenic individuals in the Denmark study to be more likely to have suffered brain damage through birth complications, encephalitis or concussion than those with a strong genetic predisposition for schizophrenia.

But what Kety feels may be most signifi-

cant is that practically all of the "environmental schizophrenics" were born in the "cold winter months" of January through April. Kety suggests that the risk for birth trauma may be higher in the winter months, particularly in northern areas, such as Scandinavia and northern portions of the United States and other countries.

However, he says, "it is equally possible that some virus may have a peak incidence in that season or, alternatively, in the warm summer months that would coincide with the first trimester of such pregnancies." Though physical evidence of any such virus has yet to be found, Kety believes the hypothesis may fit with the observed greater prevalence of schizophrenia in lower social classes.

"There are viral agents known to attack the nervous system that have properties that may be relevant," says Kety, currently on a year's leave at the Center for Advanced Study in the Behavioral Sciences at Stanford, Calif. "The prevalence of schizophrenia does not show a simple negative correlation with socioeconomic class, but ... is primarily concentrated in the lower socioeconomic classes of larger cities," he notes. "It is also known that schizophrenia has a higher recognized prevalence in urban, in contrast with rural, populations."

Such characteristics point to the possibility of "a virus whose propagation is favored by congestion, poor living conditions and less than optimal hygiene," suggests Kety. A number of bacterial and viral diseases appear to strike under similar conditions, he says. A type of congenitally transmitted virus associated with deafness and school failure was recently found to have twice the prevalence in

lower socioeconomic groups as in middle class populations, according to Kety. However, he goes on, "If a virus is involved in some forms of schizophrenia, it would be a different virus from those now known to affect the nervous system, or at least have a different type of interaction with the host."

Although there is a high incidence of childhood autism among children with congenital rubella infection, most viral disorders of the nervous system seem on the surface to be unrelated to schizophrenic symptoms. But, Kety notes, "many of these disorders involve a psychosis, often misdiagnosed as schizophrenia, in their early phases. The same is true for other neurological disorders in which a virus has not been implicated — Wilson's disease, Huntington's chorea [and] the adult form of metachromatic leukodystrophy, among others.

"This suggests that there are particular regions or pathways in the central nervous system which, when affected by one of several disease processes, produce a schizophrenic syndrome, which may then become more neurologically obvious as the disease extends to other regions. If there were a virus that affected those initial regions and did not spread beyond them, the disorder it produced might resemble typical schizophrenia very closely."

Even if such a viral agent does exist, Kety stresses that it would be just one of a number of contributors to schizophrenia, including genetic background, birth injury and other environmental factors. "There is no reason," he says, "to think that schizophrenia is a single disease, or the result of a single cause." □

U.S. space program: 20 years and changing

Last Sunday, Oct. 1, the National Aeronautics and Space Administration was 20 years old. In a speech at NASA's Kennedy Space Center in Florida, President Jimmy Carter recalled the 20 years of moonwalks, planetary probes, communications satellites and weather-watchers, and declared that "we will not give up our leadership" in space. Yet the U.S. space program is troubled, beset by conflicting views of what its priorities should be, confronted with a growing role in defense strategy, and caught between accusations of ignoring down-to-earth commitments or of failing to realize its full potential for science and exploration.

High administration officials have stated that the civilian space program is at

the threshold of change, and the reference is not simply to the coming of the space shuttle. A key factor is the significance of space activities to national security concerns, now formalized in a space policy directive issued by President Carter earlier this year — a directive whose weight has been likened by officials to that of President John F. Kennedy's declared national goal of a manned lunar landing.

The directive followed an interagency study of then-existing space policy, conducted at the President's request by a policy review committee of the National Security Council. Besides NASA and such space beneficiaries as the Agriculture and Commerce departments, the group included representation from the Joint

Chiefs of Staff, Central Intelligence Agency and other security-related entities. The resulting directive set forth policy in a number of areas, but also formalized the NSC review committee as a key element in the overseeing of space policy matters.

Part of the committee's function will be to aid information and technology exchange among the growing number of space-related federal agencies. But it is a two-sided coin.

When NASA was established, its nature as a civilian agency was stressed, both in its overall goals and in the public availability of its information, pointedly setting it apart from military concerns. There have certainly been NASA-DOD interactions, even confrontations, over the years, dealing with such matters as whether a given NASA sensor revealed too much of U.S. capabilities, or whether the NASA-funded space shuttle would be redesigned to let it land quickly from military missions (it was). But the Policy Review Committee is an official means of applying "national security" pressures to NASA's decision-making, so that all U.S. earth-oriented remote-sensing satellites, for example, will receive closer scrutiny and regulation.

The space shuttle's dual role as a civilian/military vehicle has also contributed to other concerns. Besides the main Florida launch site, a second is planned for Vandenberg Air Force Base in California, in part because it offers over-water ascents and greater payload capabilities for launches to polar and near-polar orbits. A report this summer by the U.S. Comptroller General, however, discounted several of the arguments for the site and urged Congress not to fund its construction "unless there are compelling national security reasons." A nonmilitary concern about the shuttle has been voiced by some scientists who fear that it will restrict the size and/or weight of some unmanned interplanetary probes that must be carried in the shuttle's cargo bay together with multiple auxiliary rocket stages to reach their goals.

Even NASA's most earth-related efforts have been criticized in recent months. The Landsat earth-resources program, for example, has been widely used and praised, yet in June, a task force of elected state and local officials from the Intergovernmental Science, Engineering and Technology Panel said in a report to the White House that the Landsat system lacks federal commitment to smaller-scale users and "has been planned and operated ... with little input from state and local governments." Last year, a committee of the National Research Council's Space Applications Board maintained that NASA had dropped the ball in research and development of communications-satellite technology for large numbers of small potential users, and this summer another SAB panel criticized the agency's studies of processing materials in space.

Many eyes are looking curiously toward the Space Age's next 20 years. □

Catch 3C273: Gamma rays from a quasar

Quasars have a history of being surprising. It started with them sitting there looking like stars while being no such thing. They are now known to be extragalactic, to radiate energy like galaxies over a wide range of the electromagnetic spectrum, and to do a number of other weird things. Some of them even seem to be coming apart at velocities faster than light.

So it is a difficult thing to make astrophysical models of what kind of object a quasar ought to be. As soon as an astrophysicist gets all the pieces in place that are necessary to explain current data, something new seems to come along that threatens to unbalance the act. This time it is high-energy gamma rays from one of the most famous of quasars, 3C273, found by the European Space Agency Cos B satellite.

It appears that 3C273 radiates gamma rays with energies of 100 million electron-volts per photon. This corresponds to frequencies in the range 10^{22} to 10^{23} hertz. These are really high-energy particles rather than waves, and because their presence is going to raise problems in quasar model making, it is necessary to point out that Cos B's pointing accuracy is not sharp and yields an error box of 3° by

3° in the sky. This means the source can conceivably be anywhere in the box. 3C273 is in the box, and there are other "compelling arguments" for the identification, according to the authors of the report in the Sept. 28 NATURE—B.N. Swanenburg and W. Hermsen of the Huygens Laboratory in Leiden, The Netherlands; K. Bennett and R. D. Wills of the European Space Agency's ESTEC laboratory at Noordwijk, The Netherlands; G. F. Bignami and P. Caraveo of the University of Milan; G. Kanbach and H. A. Mayer-Hasselwander of the Max Planck Institute for Extraterrestrial Physics; J. L. Masnou and J. A. Paul of the Center for Nuclear Studies at Saclay, France; and B. Sacco and L. Scarsi of the University of Palermo.

This group is already engaged in further observations of 3C273. One thing they are looking for is a time variability in the gamma-ray output similar to that found in other wavelengths. Gamma-ray observation of other quasars is also suggested. Meanwhile, there is a curious fact for quasar modelers to chew on: 3C273's rate of energy output in high-energy gamma rays is higher than in any other part of the spectrum, 10^{46} ergs per second. Inflation is a problem everywhere. □

Slow virus finally identified

For the past 25 years, medical scientists have become increasingly intrigued by a group of agents that infect people and animals yet wait months or even years before triggering disease. And when disease finally appears, it is swift, dramatic and nearly always fatal, having as its target the central nervous system. These diseases are called "slow virus diseases" and the agents that cause them slow viruses.

But are the culprits really viruses, and, if so, conventional viruses? A "Yes" to the first question, and a "No" to the second on the basis of current evidence. For instance, Canadian researchers reported three years ago that they had isolated tiny virus-like particles from the brains of mice experimentally infected with scrapie, a slow virus disease native to sheep. If the particles were indeed viruses, they were the smallest viruses ever reported (SN: 11/8/75, p. 297). And now comes even more stunning news: A slow virus (the scrapie virus) has finally been identified, and it's not even a total virus—rather a naked core of DNA without a protein coat.

This finding, reported in the Sept. 14 NATURE by R. F. Marsh of the University of Wisconsin and colleagues, also suggests that slow viruses may be comparable to viroids—viral particles that cause certain plant diseases. Like the scrapie virus, viroids lack a protein coat, but, unlike the scrapie virus, they contain a core of RNA rather than a core of DNA.

One reason the scrapie virus has remained so elusive till now is that it hooks on tight to target brain cell membranes and thus is difficult to separate from the membranes for study. Recently, though, Marsh and company found that they could obtain lots of membrane-free viral material from hamsters infected with scrapie. They then set about separating the material with two different techniques—chromatography and electrophoresis—and submitted it to enzymes that degrade DNA, RNA and protein, respectively. Only the DNA-inactivating enzyme destroyed the scrapie virus infectivity. So the researchers concluded that the virus must be a core of DNA without a protein coat.

Such a finding really isn't that surprising, notes Howard Temin of the University of Wisconsin and a Nobel Prize-winning cancer virus scientist. "The DNA of some viruses enters and leaves cells during normal animal development," he says. What is disconcerting about the discovery, however, is that it tends to rule out the possibility of ever vaccinating people against slow-virus diseases, because immunization only works against viruses with protein coats. Nonetheless, as R. P. Hanson, one of Marsh's co-workers, points out, "Diseases that destroy brain ... have long periods of remission ... If we could find the cause of this, we may be able to induce remission throughout the lifetime of an infected person." □