NIMH Celebrates 40th Birthday

Abundant new findings on mental disorders attend dramatic advances in brain sciences

THE growing awareness of the biological bases not only of major mental illness but of a variety of behavioral disorders was evident at a 2-day symposium the National Institute of Mental Health held recently to celebrate its 40th birthday.

The meeting, held at the National Academy of Sciences, was sparsely attended but nonetheless featured a parade of stars in the mental health arena, including Nobel prize winners Julius Axelrod of NIMH and Gerald Edelman of Rockefeller University; health patronesses Mary Lasker of New York and Florence Mahoney of Washington, and a variety of prominent researchers and administrators.

The theme of the meeting could have been "beyond the nature-nurture debate." As presentations unfolded, it became apparent the dichotomy implied by the genetics versus environment debate—when applied to anything involving human behavior—is so simplistic as to have become largely irrelevant. The immutability implied by the label "genetic" does not in fact exist; "environmental" applies not only to external influences but to endogenous biological phenomena.

Speakers seemed to be reaching for new metaphors as they described the dramatic advances in the neurosciences and mental illness research since the Mental Health Act was signed in 1946—most having occurred in the past decade or so. Several participants suggested that the study of the brain calls for new dynamic models patterned on evolutionary theory. Speakers also compared the genetics-environment dichotomy to the depiction of light as being a particle or a wave, noting that it represents alternative approaches to studying phenomena in which the two functions are indivisible.

The pervasiveness of biology is showing up in studies of the temperaments of children, according to Jerome Kagan of Harvard University. He reported that fearfulness or "inhibition" is a remarkably stable trait that differentiates some children from those who are outgoing and adventurous, and that this characteristic correlates with measures showing that they have a lower threshold of central nervous system reactivity. The distinction holds up cross-culturally—Japanese researchers have found temperamental differences in newborns that predict the characteristics Kagan has measured. It also applies across species. Investigators have found that by the age of 2 months, some cats are fearless, while others avoid unfamiliar rooms and people and will not attack rats.

Kagan said the only cases in which biological measures did not predict inhibition in inhibited-acting children was when the children were under emotional stress or when they (in this instance, girls) had been strongly conditioned by their families to quiet, passive roles.

Gerald Edelman: *Neurons vary within genetic directions.*

Variable interactions between the genetic and environmental influences are becoming increasingly apparent even at the cellular level, said Gerald Edelman, who talked about neuronal group selection. There is "great variance in neural structure within genetic directions," he said, showing slides of groups of neurons with identical genetic coding that had developed differently because of differential amplification at the synapses. What this means is that even identical twins, while genetically the same, are different. This line of research might offer clues as to why in a strongly hereditary illness—schizophrenia, for example—one identical twin will develop the disease while the other will not.

George Vaillant of Dartmouth Medical School observed that psychiatry continues to confuse the environmental with the organic, while failing to see "what is dynamic." Longitudinal studies, he said, can often supply unexpected insights into such interactions. He cited, for example, the case of a family of four manic-depressives. A chart of their various episodes of mania, depression, and hospitalization over 40 years revealed that in 12 of the 13 episodes experienced by family members, one fell ill within a year after another one did, suggesting that although the illness is clearly genetic, it has environmental precipitants. In contrast, he discussed a longitudinal study at Harvard of male alcoholics. Although at first glance alcoholism in the "core city" sample appeared to be related to psychopathology and unemployment, the data showed that parental alcoholism—and not broken homes—was the only valid predictor (other than ethnic background). Thus "an illness that appears environmental is in fact [in large part] genetic."

As presentations attested, recent findings have put the lie to some widely held assumptions about other disorders. Judith Rapoport of NIMH, for example, told of research with obsessive-compulsive children that strongly suggests that this is not, as was believed, a learned disorder. Rather, it appears that children with this problem also manifest neurobiological anomalies, including dilated brain ventricles, and perform poorly on certain cognitive tests. Clomipramine, an antidepressant, is effective in treatment of the disorder, which suggests involvement of the serotonergic system.

There is also newly emerging information about the genetic basis of obesity. Albert Stunkard of the University of Pennsylvania said that for a long time it looked as though socioeconomic status was the strongest predictor of obesity. But twin studies have shown that identical twins are six times as likely to be concordant for fatness as other siblings. And Danish adoption studies have shown that while an adoptee's body mass tends to correlate with adoptive families while the child is living in the same household, "childhood family environment alone has little or no effect on fatness" (*Science*, 4 April, p. 20). Yet to be determined is whether this genetic propensity is more a tendency toward fatness or a tendency to overeat. But in this case, etiological findings do not change the solutions, said Stunkard, which are diet and exercise.

Marc Schuckit, an alcoholism researcher at the University of California at San Diego, related that the alcoholism story is very like

the obesity story. Only in the 1970's did Scandinavian adoption studies confirm that a vulnerability to alcoholism is highly heritable. Now Schuckit is looking at a high-risk group—sons of alcoholics—to try to locate predictive factors. He has found that while they do not differ biologically or psychologically from controls prior to taking a drink, the sons of alcoholics get less "high" according to both subjective and objective measures such as body sway. They also show more rapid decreases in cortisol and prolactin, two chemicals that rise with alcohol intake. But, as Schuckit indicated, even if a chemical "marker" for vulnerability to alcoholism is found, the mental health system will always be intimately involved with treatment and prevention.

Infants, like kittens, may be innately fearless or inhibited.

As these speakers made clear, biological etiology does not automatically imply primary reliance on biological treatment interventions. In Alzheimer's disease, for example, Gene Cohen of NIMH related that psychiatric treatment can make major inroads on accompanying symptoms such as depression and delusions. And Gerard Hogarty of Western Psychiatric Institute and Clinic in Pittsburgh reported results of a "family psychoeducational study" showing that high relapse rates that afflict schizophrenics despite drug therapy can be avoided with carefully orchestrated family therapy.

Speakers at the meeting waxed enthusiastic about the current "golden age" of brain research, advances in imaging technology, refined biochemical measurements, new families of psychotropic drugs, and the increasing sophistication in diagnosis. Herbert Pardes of Columbia University College of Physicians and Surgeons quoted Lewis Thomas to the effect that "the decades ahead will almost certainly revolutionize all our earlier notions about the brain and the mind that it operates or that operates it."

But as psychiatrist David A. Hamburg, president of the Carnegie Corporation, pointed out, mental health must be addressed at all levels—from the cell to the organism to populations—and warned that some social sciences are being as badly ignored today as genetics was 40 years ago. So nature versus nurture is beside the point. The relevant questions have to do with which levels of inquiry will produce the most fruitful results. ■

CONSTANCE HOLDEN

Pentagon Plans New Antisatellite Tests

The political outlook for the program has improved, although a new report by the General Accounting Office is beginning to stir up trouble

THE U.S. antisatellite (ASAT) weapon program, hobbled last year by congressional opponents, will soon be reinvigorated if the Pentagon gets its way. Legislation proposed by the Reagan Administration and approved by the Senate Armed Services Committee will provide an infusion of $113 million in new funds, as well as authorization for a new round of tests against targets in space.

Many of the opponents, who persuaded Congress to ban such tests last year, concede that the outlook for the program is now much more favorable. Previously, they had garnered support from those who doubted whether the ASAT would work, as well as those who feared it would work too well. Senior Air Force officials conceded that ASAT suffered from various technical ailments and called it one of the most difficult military development programs ever undertaken.

But now, after an intense round of internal criticism, the program has been reorganized and obtained new management. ASAT production has been postponed, research has been stepped up, and a new effort has been devised to increase reliability and quality control. Integrated chips in the ASAT will be modernized, its computer software and electronics will be improved, and its propellant will be modified in an effort to avoid additional technical embarrassment. The goal is to possess a device, no bigger than a breadbox, capable of streaking into space at enormous speed and running head-on into Soviet satellites.

Congressional opponents, led by Representatives George Brown (D–CA) and Norman Dicks (D–WA), thought they had stymied this goal forever by successfully enacting a ban on ASAT tests against space targets, contingent on the observance of a testing moratorium by the Soviet Union. But they were shocked to learn from lawyers at the General Accounting Office (GAO) a month ago that their ban is temporary, not permanent, and good only through the end of the current fiscal year.

Since then, they have been scrambling to resuscitate the coalition of arms and waste controllers who voted to terminate the program on the last go-around. Their principal weapon is another recent GAO report which suggests that the new ASAT reorganization is a bust. Details of the 36-page report, dated 11 June, are scarce because it has been classified "Secret" by the Pentagon. But among its conclusions are the following:

- Although the program's overall size has been drastically reduced under the reorganization, its cost—roughly $4 billion—will still be much higher than promised. Based on total expected research, development, operations, and maintenance expenses, the cost of each ASAT weapon will in fact be roughly $110 million, nearly as much as some of the satellites in the target set, and more than 50% above last year's estimates and 350% above initial expectations.
- Due to various deployment constraints, the ASAT will under some scenarios be incapable of quickly destroying the Soviet satellites considered most worrisome by the United States. In addition, it may be incapable of reaching the required altitudes because of limitations in the power of the F15 jet fighters from which it is launched.
- Internal disagreement about the program persists, with one branch of the Air Force, concerned with weapons reliability, arguing that the test program is too meager, and another, concerned with its development and cost, insisting that it is adequate. Brown, who declines to comment on the GAO report in detail, concludes that it "shows that the ASAT program is way over budget, way behind schedule and unable to meet its mission requirements. If Congress gives this program the go-ahead, we'll end up with a multi-billion-dollar boondoggle that's obsolete the day it's deployed."

An Air Force official, connected with the space defense program, vigorously contested these criticisms in an interview with *Science* that was approved by the Air Force Secretary. "We simply don't think it's a problem," was the official's refrain in addressing each of the GAO complaints. He does not dispute that a year ago the program was in