Behavior

Leaving hyperactivity behind

Young boys with hyperactivity have more than their share of problems in concentrating, keeping a rein on their impulses and sitting still during school lessons. On top of their early difficulties, a recent study found that boys diagnosed as hyperactive between ages 6 and 12 were twice as likely as nonhyperactive boys to have psychiatric disorders as they approached adulthood, between the ages of 16 and 23 (SN: 10/19/85, p.245). In addition to a continuing excess of hyperactivity, the former group was more likely to abuse drugs and engage in recurring delinquent and aggressive acts.

Not a bright picture, but the January ARCHIVES OF GENERAL PSYCHIATRY contains some encouraging news from the same study. In the group of 101 hyperactive boys, those who had no psychiatric disorders in adolescence and young adulthood – a total of 52 – were about as well adjusted as the 80 nonhyperactive boys who continued to be free of psychiatric disorders. Another 20 subjects from the nonhyperactive group were excluded from the comparison because of psychiatric problems that emerged during adolescence.

Interviews with each subject and one or both of his parents, as well as a review of school records, indicated that former hyperactives and controls were no different in a number of areas: job adjustment, control of temper outbursts, delinquency, violent behavior and drug use, including alcohol. Former hyperactives report more trouble concentrating and a greater tendency to be "on the go," but not to the point that it disrupts work or school functioning, say Salvatore Mannuzza of the New York State Psychiatric Institute in New York City and his colleagues. Academic achievement and extracurricular activity in high school was, however, higher among the controls.

The findings contradict a theory held by some researchers that hyperactive children who shed the full-blown disorder in their teenage years still tend to have lingering problems, such as frequent drug use or symptoms of depression.

The long and short of welfare

Recent studies have questioned the belief that, in most cases, welfare programs help to perpetuate poverty (SN: 3/17/84, p.169). Greg J. Duncan of the University of Michigan in Ann Arbor and his colleagues review the available evidence on welfare in the Jan. 29 SCIENCE and conclude that "the welfare system does not foster reliance on welfare so much as it acts as insurance against temporary misfortune."

From the mid-1960s to the late 1970s, recipients of Aid to Families with Dependent Children (AFDC) were typically on the welfare rolls for less than four years, say the researchers. About 30 percent of recipients received welfare for one or two years, and 40 percent received it for three to seven years. AFDC benefits are generally available only to women heading households with dependent children. Furthermore, only about one out of five women in their early 20s who grew up in a family that received AFDC throughout a three-year survey period was similarly dependent on the welfare program. But it is difficult to estimate the transmission of welfare dependence from generation to generation, note Duncan and his co-workers. A child's use of welfare as an adult may be affected by a number of factors that researchers have not yet accounted for, such as parents' involvement with children and the quality of schooling.

Despite indications that much welfare use is short-lived, about 30 percent of AFDC recipients remain on welfare for eight years or more. According to the researchers, this raises questions of whether, in some instances, welfare promotes divorce or out-of-wedlock births, discourages marriage, erodes work effort or instills counterproductive attitudes that encourage reliance on welfare.

Chemistry

A superoxide way to get rid of PCBs

The large family of chemical compounds known as polychlorinated biphenyls (PCBs) has a reputation for toxicity. Once used as nonflammable, heat-dissipating, insulating liquids in transformers and other electrical devices, these oily substances are no longer manufactured. Left behind, however, is the problem of safely cleaning up, degrading or destroying the large quantities of these noxious materials that were generated in the past (SN: 9/5/87, p.154). Recently, a team of chemists at Texas A&M University in College Station happened upon a chemical reaction that efficiently converts PCBs and related compounds into sodium bicarbonate and sodium chloride. The unexpectedly complete chemical degradation shown by this reaction makes it a possible alternative to methods such as incineration for disposing of PCBs.

The new chemical reaction, discovered by Donald T. Sawyer and his colleagues, uses superoxide ions to convert the PCBs. Each superoxide ion can be thought of as an oxygen molecule, made up of two oxygen atoms, with an extra electron to give the ion a negative charge. Cosmic radiation creates superoxide ions in the upper atmosphere, and biological processes generate these ions during respiration. In the laboratory, superoxide ions can be generated in electrochemical cells.

One big advantage of the process is that it seems likely to work on any scale – in small batches or in large loads. The reaction is also highly selective, reacting only with PCBs and their relatives, even when they happen to be mixed with other hydrocarbons. However, superoxide ions also react readily with water. Any reactions involving the ions must be done in nonaqueous solvents, and PCB samples must be kept dry. The new reaction is described in the Dec. 23 JOURNAL OF THE AMERICAN CHEMICAL SOCIETY.

Measuring the lengths of molecules

"Small is beautiful" has become the motto of chemists investigating molecular arrays on the nanometer (10^{-9} meter) scale. Besides learning about the properties of molecules as they begin to form such assemblies, these tiny arrays may one day be the building blocks of minuscule electronic devices and chemical sensors (SN: 10/3/87, p.214).

But in order for good things to come from these tiny molecular packages, scientists must devise tools for imaging and measuring them. In the Jan. 20 JOURNAL OF THE AMERICAN CHEMICAL SOCIETY, researchers describe a kind of "molecular ruler" for doing that. Larry L. Miller at the University of Minnesota in Minneapolis and his colleagues developed an improved method for using a scanning transmission electron microscope (STEM) to measure organic molecules' lengths.

Normally these molecules cannot be imaged with a STEM because it only detects atoms that have a dense enough electron cloud to deflect the STEM's probing electron beam. So scientists have sized up organic molecules by marking their ends with a protein called ferritin, which contains electron-rich iron atoms. However, ferritin is large and unpredictable in the way it binds to the molecules, making it difficult to measure structures smaller than about 20 nanometers. Moreover, says Miller, it wasn't entirely clear that this method was accurate, since past work was done on biological molecules that could distort when ferritin was attached.

Miller's group showed that the labeling method does indeed work by measuring *rigid* organic molecules of previously calculated lengths. And instead of ferritin, the researchers attached smaller iridium clusters to the molecules' ends, which enabled them to resolve distances as small as 2 nanometers. Miller expects that with refinement, the technique will allow his group to measure separations 10 times smaller – distances just a bit larger than the typical length of molecular bonds.

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