BEHAVIOR

The pathogenic commune

Many behaviorial scientists, from the 1940s on, have embraced the notion of the "schizophrenogenic" family — which, through its own unhealthy dynamics, "teaches" psychopathology to its offspring. In order to investigate the relative roles of genes and family environment in the genesis of schizophrenia, National Institute of Mental Health scientists decided 14 years ago to follow and compare children of schizophrenics raised at home with children who were buffered from the influence of their schizophrenic parents. Psychologist David Rosenthal, since retired from NIMH, decided that the kibbutzim of Israel, in which child rearing is a community project, would provide an ideal natural laboratory to study the interplay of nurture and nature.

What the researchers have found points to a new and baffling notion — the schizophrenogenic community. According to psychologist Allan Mirsky, who has taken over the study, 100 Israeli children from 8 to 14 years old were originally studied in 1967; half had one schizophrenic parent, and half had two healthy parents. Out of each of these two groups, half were raised in cities by their natural parents; the other half were raised in kibbutzim, where their parents also lived. When 91 of the subjects were reexamined in 1981 — when most were in their late twenties — it was found that the children of schizophrenics raised in kibbutzim had a much higher incidence of psychopathology than any of the other groups — including those raised by schizophrenic parents. According to Mirsky, 16 of 22 had diagnosable mental illness; 6 had schizophrenia and 10 suffered from mood disorders. In contrast, only 6 of 21 children raised by their schizophrenic parents were ill; 3 were schizophrenic. There were no major psychiatric disorders among controls. Mirsky is at a loss to explain the results, which are the opposite of what was predicted. Perhaps, Mirsky speculates, the closed kibbutz society increases risk of mental illness by making it difficult for children to hide the fact of their parents' sickness.

Evolution of the cortex

The distinguishing feature of the human brain is its large cortex. But there is evidence that some humans — hydrocephalics, for example — function perfectly well with a significantly diminished cortex. Why, scientists have wondered, did the human cortex — which is metabolically very expensive to run — evolve in the first place? According to NIMH zoologist James Hill, the chief function of the cortex may be to "fine tune" behavior — to make behavior appropriate for a complex world.

By treating pregnant rats with a drug called MAM, Hill produced a generation of rats with greatly diminished cortex tissue. These "primitive" rats and normal controls were placed in two environments — one much more complex than the other — and their activities were monitored by computer for more than 150 days. Although the primitive rats showed minimal intellectual deficit, those in the complex environment proved incapable of raising offspring. Mothers built nests in exposed areas, and males, who were inappropriately aggressive, tended to cannibalize the vulnerable pups; only 10 percent survived to weaning age, compared with 85 percent of control pups. In addition, Hill reports, the MAM-treated rats were extraordinarily curious, exploring their environment without fear yet never seeming to settle in. The experimental rats were often wounded because of their own unguarded aggression, and they tended to "scream" at one another in frustration. In short, Hill concludes, the rats lacked the ability to deal appropriately with complexity. If these primitive rats had predators they would not survive, he says, and if their brain was inheritable they would soon be extinct—just as certain primitive mammals became extinct as the environment became more and more complex.

EARTH SCIENCES

The Panama isthmus and changing seas

Studies of bottom-dwelling foraminifera, single-celled marine organisms made mostly of calcium carbonate, show that the difference between the amounts of isotopic carbon in the Pacific and Atlantic oceans increased 6 million years ago. The differences increased again 3 million years ago to the modern level, so that today the Pacific contains one part per thousand more ^{12}C than the Atlantic, reports Lloyd Keigwin of Woods Hole Oceanographic Institution in the July 23 SCIENCE. Is this because the continental land masses were moving, causing the shoaling of the Panama isthmus, or because of changes in circulation of the oxygen-rich, nutrient-poor North Atlantic Deep Water (NADW)? After studying two cores collected from the Caribbean Sea and the Pacific as part of the Deep Sea Drilling Project, Keigwin concludes that each explanation is valid ... but for different times. For the change 6 million years ago, he says, "I favor shoaling of the isthmus above some level high enough that bottom and intermediate waters can no longer get across." Atlantic waters, blocked in their passage between the Americas, would have been forced to travel a longer route, picking up more organic matter before merging into the Pacific. By 3 million years ago, the Panama isthmus was securely in place, Keigwin writes, a fact that leads him to conclude that the second cycle of ^{12}C enrichment was caused by increased production of NADW, possibly a reaction to the cooling of the Northern Hemisphere. Completion of the Panama isthmus also may have deflected the North Atlantic Equatorial Current away from its previous route between the Americas and toward the Northeast, strengthening the Gulf Stream. Previous studies have shown that the Gulf Stream intensified until about 3.8 million years ago; 800,000 years later the permanent glaciers began to form on the Northern Hemisphere continents, possibly fed by moisture sent to high northern latitudes by the intensified Gulf Stream. Insights into past changes in ocean chemistry and circulation are important, Keigwin notes, because they "will help us understand why the ocean is circulating the way it does today. Ultimately we want to study the causes of climatic change, and to be able to predict it."

Ancient ice there for the taking?

For a person hunting for meteorites, a stroll along stretches in Antarctica's Allen Hills can be nirvana. Meteorites litter the ground, exposed where glacial ice has evaporated. When Ian Whillans of Ohio State University's Institute for Polar Studies and William A. Cassidy of the University of Pittsburgh began investigating the reasons for the abundance of meteorites, they found that some ice in the area may be as old as 600,000 years. Their proposed age for the ice has been challenged by Japanese scientists, who suggest that the ice is far younger. But if the finding is confirmed, the ice will be the oldest discovered so far. Ice cores obtained from the Greenland Ice Sheet (SN: 6/9/82, p. 408) and from Antarctica provide the oldest polar ice of confirmed age, dating back about 125,000 years. Whillans explains that as the glacier tries to ride over the Transantarctic Mountains, it is tilted up so that the oldest ice is that nearest the mountain. Ice age decreases chronologically with distance from the mountain, he says. He assumes that the meteorites, ages of which span the same interval as the ice, fell to earth at the same time as the snow (transformed into ice) exposed along a mountainside. The discovery, he says, would afford researchers plentiful ice of great antiquity without the expensive and technologically difficult effort of drilling vertical cores. There are drawbacks as well: The ice is less pure than that obtained by drilling because it has been distorted by its extended flow as part of the glacier, and has been altered by fluctuations in pressure and by exposure to surface air. □