Schizophrenia gene: A family link fades

With much fanfare, scientists recently announced they were closing in on a gene predisposing its bearers to schizophrenia, a severe mental disorder afflicting about 1 in 100 people worldwide (SN: 11/12/88, p.308).

But simultaneous evidence from another research team suggested schizophrenia is too complex to result from a single gene — a contention now supported by a report from Scotland and an ongoing investigation at the University of Utah.

The genetic locale initially linked to a purported schizophrenia-predisposition gene occupies a small portion of chromosome 5. DNA-cutting enzymes revealed a common genetic variation on chromosome 5 among schizophrenics in seven families. The technique hinges on studying DNA samples from large families with many schizophrenic members.

Using this approach, psychiatrist David St. Clair of the University of Edinburgh and his colleagues find no link between the inheritance of the chromosome 5 variation and schizophrenia in 15 Scottish families, they report in the May 25 NATURE. They analyzed DNA from 166 family members, 44 of whom were diagnosed schizophrenics. Another 31 members had other psychiatric diagnoses.

A link to chromosome 5 still did not show up when the researchers included in the schizophrenia group four members of the families with diagnoses closely related to schizophrenia, the team asserts.

In families with many schizophrenics in two or more generations, the susceptibility gene on chromosome 5 — if it does indeed exist — contributes to only a minority of schizophrenic cases, the Scottish researchers conclude.

"We're 90 percent sure we have no linkage [of schizophrenia] to the chromosome 5 region previously studied," adds psychiatrist William Byerley, director of a similar study at the University of Utah in Salt Lake City. Byerley and his co-workers, whose study is nearing completion, are using several enzyme "markers" to examine the DNA of six families living in Utah, all of northern European ancestry. Genetic material was obtained from 60 individuals, 24 of whom had a diagnosis of schizophrenia. *— B. Bower*

Questioning the cooling effects of volcanoes

Sleet, snow and bleak temperatures besieged New England in the summer of 1816. August frosts gripped farms, devastating crops. Some scientists have blamed this "year without a summer" on the 1815 eruption of the Indonesian volcano Tambora, noting that volcanic debris can significantly dim sunlight over large portions of the Earth. Still, researchers disagree over how much volcanoes actually change the climate.

Two atmospheric scientists now conclude that, while major volcanoes can lower temperatures slightly, the crazy cold snap of 1816 and other dramatic temperature dips stemmed not from volcanoes but from other, unidentified freaks of nature.

Clifford F. Mass and David A. Portman of the University of Washington in Seattle undertook an extensive study of climate and temperature records from the years surrounding nine volcanic eruptions, including Tambora. Mass says the most important aspect of the study is that he and Portman separated out temperature changes caused by the El Niño-Southern Oscillation (ENSO), the unpredictable ocean phenomenon that wreaks havoc on weather patterns every few years. They also avoided some of the "noise" from random weather fluctuations, he says, by averaging the temperature trends associated with several volcanoes. "We are struggling to pull a weak signal out of a lot of random flux," says Mass.

After subtracting ENSO's influence, Mass and Portman saw clear temperature drops following five major eruptions, including Indonesia's Krakatoa in 1883 and Mexico's El Chichón in 1982. But Mass says these dips were too small in relation to the effects of ENSO and other year-to-year variations to set off a cold spell as drastic as the one in 1816.

The researchers estimate in the June JOURNAL OF CLIMATE that the most prolific eruptions lowered hemispheric temperatures by only about 0.3°C — a subtle change, Mass says, considering previous observations that major volcanic debris can block 10 to 30 percent of incoming sunlight. He adds that the debris blocking incoming sunlight may also hold heat at the Earth's surface, mitigating the cooling through a greenhouse-type warming.

Other scientists dispute Mass and Portman's conclusions. Alan Robock of the University of Maryland in College Park thinks volcanoes have a definite influence on climate, asserting that even a fraction of a degree of hemispheric cooling can bring profound effects. A small average cooling over a hemisphere could involve extreme chilling of a few sensitive areas, and New England may have been such an area during the shivery summer of 1816, he says. *— F. Flam*

Serum albumin seen in three dimensions

Like one of those does-everything gadgets advertised on late-night television, serum albumin — the most abundant blood protein — plays more roles than would seem reasonable for a single molecule. It regulates blood volume. It stores molecules and shuttles some of them through the circulatory labyrinth. It also controls the blood concentration and bodily distribution of many drugs.

NASA researchers have determined the three-dimensional structure of human serum albumin with enough detail to visualize what parts of the protein bind aspirin, Valium, calcium and other molecules. Reporting in the June 9 SCIENCE, the scientists say their work should help researchers uncover molecular details responsible for the protein's versatility. It also could help drug designers circumvent serum albumin's tendency to mop drugs out of the bloodstream before the drugs can reach their targets.

"People have thought of serum albumin as being a sticky molecule," says crystallographer Daniel C. Carter, leader of the research team at the Marshall Space Flight Center in Huntsville, Ala. The crystal structure suggests that only a few regions of the cigar-shaped protein are responsible for this stickiness and that these areas bind chemically diverse molecules and atoms ranging from calcium to fatty acids to aspirin.

To determine a protein's structure using X-ray crystallography, researchers begin by growing millimeter-sized crystals that are stable and strong enough to withstand analysis, which involves bouncing X-rays off the crystal's features and noting the pattern and strength of reflected rays. No other group has grown serum albumin crystals hardy enough for such study, remarks British chemist Max F. Perutz of Cambridge University's Laboratory of Molecular Biology, winner of the 1962 Nobel prize in chemistry for solving the crystal structure of hemoglobin.

Using a battery of mathematical tools for making sense of data collected from hundreds of crystals, the NASA researchers discovered how human serum albumin's chain of 585 amino acids snakes around to form the protein's biologically active three-dimensional shape. Next, Carter expects to use an especially intense X-ray source to do even higher-resolution studies that could reveal the chemical mechanisms at work in albumin's sticky zones.

"When [Carter] has done this, it will be of immense help for drug design," Perutz told SCIENCE NEWS. One specific use might be for designing drugs to treat sickle cell anemia. Perutz says such drugs show promise in the test tube but cannot elude serum albumin's sticky grasp. *— I. Amato*