Schizophrenia: Encouraging outlook emerges

Mental health workers have long viewed schizophrenia as a severe mental illness that usually gets worse over time. But new evidence gathered in three countries suggests that people diagnosed with schizophrenia tend to experience "progressive amelioration" over the two decades following their first admission to a psychiatric hospital.

"'Amelioration' doesn't mean 'cure,' but the data challenge widespread pessimism about the course of schizophrenia," contends psychiatrist William W. Eaton of Johns Hopkins University in Baltimore, who directed the international research effort. "A major implication is that long-term treatment for schizophrenia, which is often not available, may be worth the effort."

The findings generally support a 30-year study of schizophrenic patients in Vermont, in which more than half eventually showed substantial improvement (SN: 6/1/85, p.340).

Schizophrenia involves a perplexing fragmentation of thought and emotion. Psychotic symptoms, such as bizarre delusions and hallucinations, overlie more pervasive "deficit" symptoms, including an inability to deal with others or hold down a job, deadened emotions, and incoherent thoughts. Psychiatrists divide the disorder into several types, based on the mix of symptoms.

An estimated 1 percent of the world's population develops schizophrenia. The disorder usually first appears in adolescence or young adulthood.

Eaton and his associates examined data collected at all psychiatric facilities in the Australian state of Victoria, England's Salford Metropolitan District, and Denmark. The researchers identified a total of 1,850 schizophrenics tracked for 16 to 20 years following an initial stay in a psychiatric hospital.

Return admissions to a hospital for psychiatric treatment clustered in the four or five years after a participant's first hospital stay, Eaton's team reports in the current SCHIZOPHRENIA BULLETIN (volume 18, number 2). A statistical analysis of the data indicates that each additional admission to a psychiatric hospital among this population of schizophrenics lowered the risk of a further hospitalization by about 10 percent.

Between 50 percent and 80 percent of the sample, depending on the country of origin, returned to the hospital at least once during the follow-up period.

Analysis of a larger group of schizophrenic patients from these three countries – combined with data from a seven-and-a-half-year study of 13,870 first-admission schizophrenics in Maryland – indicates that those who develop this mental illness in their teens stand the greatest chance of requiring multiple hospital stays. Although clinicians often assign a particularly bleak outlook to single men with schizophrenia, neither gender nor marital status substantially affected the risk of rehospitalization when the researchers statistically controlled for the participants' age at first hospitalization.

Uncertainty still clouds long-term predictions concerning schizophrenia. For instance, another research group recently reported that patients with severe deficit symptoms, but not necessarily an early age of onset, fared most poorly over two decades (SN: 3/21/92, p.181).

And the Vermont study finds that among individuals followed for 30 years or more after a first admission for schizophrenia, early age of onset "washes out" as a risk factor, asserts psychologist Courtenay M. Harding of Yale University School of Medicine in New Haven, Conn., who directs that ongoing project.

Harding also suspects that schizophrenia may proceed differently in men and women, despite the findings of Eaton's group. Preliminary evidence suggests that estrogen may partially block the transmission of dopamine, a chemical messenger in the brain widely thought to play a key role in schizophrenia, Harding says. This may explain why schizophrenia often appears later among women, she maintains.

As a result of estrogen's influence, women may need especially low doses of standard antipsychotic drugs, which also interfere with dopamine transmission, Harding argues.

Still, she welcomes the finding of "progressive amelioration" among schizophrenics in Eaton's international study. Harding's team now plans to pursue the theory that an as yet unknown brain mechanism gradually works toward recovery in many cases of schizophrenia.

"The notion of 'once a broken brain, always a broken brain' may not be true," Harding contends. *– B. Bower*

Brain receptor shapes voles' family values

The sexual and parental behavior of a species of wild rodents called mountain voles makes Murphy Brown look like a model mother.

Mountain, or "montane," voles live in isolated burrows and avoid other voles except to mate – which they do often and indiscriminately. Female montane voles usually abandon their pups soon after birth, and male montane voles never even see their offspring. Not that the pups themselves seem to mind: When a montane vole pup is plucked from its nest, it neither calls for its mother nor experiences a surge in stress-related hormones.

Two behavioral neuroscientists have now uncovered a clue that could explain this lack of family values. Thomas R. Insel and Lawrence E. Shapiro of the National Institute of Mental Health's facility in Poolesville, Md., have found that promiscuous montane voles have fewer receptors for the reproductive hormone oxytocin in key areas of their brains than do their monogamous, family-oriented cousins, the prairie voles.

The researchers say their finding – published in the July 1 PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES – could have implications for human sexual and parental behavior. They say it could also shed light on the causes of autism, a brain disorder characterized by the diminished ability to interact and form relationships with other people.

Insel and Shapiro began studying voles after discovering the importance of oxytocin to the reproductive behavior of mice and rats. They turned to voles to confirm that their earlier findings were real, not artifacts caused by several generations of life in a laboratory.

Insel

A female prairie vole nursing her pups.

The researchers maintained newborn voles of both species until the age of 3 months. They found that the voles' captive behavior mimicked that in the wild: The montane voles fought off other voles, while the prairie voles usually sat side by side with a mate.

When Insel and Shapiro stained brain slices taken from both groups of voles with radioactively labeled oxytocin, they found that prairie voles had three times the amount of oxytocin receptors in their prelimbic cortex – and seven times the amount of such receptors in their nucleus accumbens – as found in montane voles. The researchers also discovered similar differences between the brains of two other vole species – monogamous pine voles and polygamous meadow voles.

Moreover, they found that the concentration of oxytocin receptors in the brains of montane voles surged during the brief period following birth when the females cared for and nursed their young. In contrast, concentrations of receptors for two other brain chemicals important in social behavior remained constant

among all of the species. And all of the vole species had roughly the same concentrations of the oxytocin hormone itself.

"This is evidence that oxytocin receptors may be very important for the social, 'affiliative' behaviors that make animals receptive to social attachments," Insel concludes. However, he adds, researchers have not yet determined the exact functions of the brain regions he and Shapiro studied, although the areas are thought to play a role in reproduction.

Insel says a team of Swedish researchers recently reported that human forebrains bear a large concentration of oxytocin receptors. "The question now is whether the level of that receptor changes over time," he asserts. "Is it different before than after puberty? Does it vary in women at different times of the month?" He and Shapiro next plan to measure oxytocin receptor concentrations in the autopsied brains of autistic individuals to see if lower amounts might explain the social isolation of autism.

Cort Pedersen, a behavioral neuroscientist at the University of North Carolina in Chapel Hill, says the new study is "very convincing" that oxytocin receptors shape sexual and parental behavior in rodents. He adds that the autism link "is an interesting and potentially clinically relevant idea." *– C. Ezzell*

From seaweed, a lighter-than-air solid

James Stoots/LLNL

Floating on soap bubbles overflowing from a jar, this airy, white solid represents the latest in featherweight materials. But made in its densest form, SEAgel (Safe Emulsion Agar gel) can support thousands of times its own weight. And it's even edible.

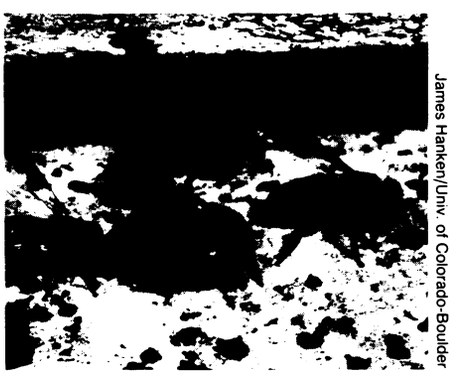
Produced from a natural material – seaweed – with a simpler technology than the light-as-air aerogels (SN: 5/5/90, p.287), SEAgel is 10 percent lighter than either air or aerogels. Only the air trapped in its microscopic pores keeps it on the ground, says Robert L. Morrison, a physical chemist who helped develop SEAgel at the Lawrence Livermore (Calif.) National Laboratory.

Morrison starts with agarose, a commercially available product extracted from kelp for use as a thickener in foods. He dissolves and emulsifies the agarose, then cools the emulsion to make a gel. He freezes and then freeze-dries the gel to make SEAgel's final gossamer form. He varies the density by varying the initial amount of agarose in his solution.

"The strength increases as the density goes up," Morrison says. Because this solid foam insulates well, he thinks it could replace balsa wood as a sound barrier in aircraft or high-speed rail cars. It may also prove useful as an inexpensive insulation for refrigerators or oil tankers.

Agarose's low cost and SEAgel's simple processing make this an attractive new material, Morrison says. And because SEAgel is biodegradable, it could prove a better packing material than plastic chips, he says. Others have suggested using the product as a time-release packaging for medication, insecticide or even fertilizer.

Bees use chemical password to show kinship



James Hanken/Univ. of Colorado-Boulder

Bees attack a newcomer (center) lacking the correct chemical cue.

Wouldn't life be simpler if, just by dabbing on the right cologne, you could guarantee that your colleagues would welcome you into a new office?

Such may be the case for honeybees introduced to a new hive.

Entomologists studying communication in bees have discovered that a newcomer's acceptance or rejection – and possibly death – appears to hinge on a single chemical signal that overrides a multitude of other odors emitted by bees or present in a hive. That chemical password may differ from hive to hive but seems consistent within a colony, says Michael D. Breed of the University of Colorado at Boulder.

Worker honeybees distinguish themselves in the animal kingdom by their extreme devotion to their colony. But this social system requires that they have some way to tell kin from unrelated interlopers.

For the past several years, Breed has investigated whether honeybees recognize their hivemates by a common "hive odor" that young bees learn and use as a cue for the rest of their lives. He separated various components of beeswax from the hive's honeycomb, then tested them to see which chemicals affected honeybee recognition. He could not isolate the exact compounds, but he did find that two chemicals – hexadecane and methyl docosonoate – were very similar to the ones in beeswax that honeybees seemed to depend on for communication.

Breed and Glennis E. Julian, then an undergraduate student from Pomona College in Claremont, Calif., went on to test the two chemical cues together and separately on bees removed from a single hive and raised in groups of 10. For five days, the researchers exposed each group to one, both or no chemicals. Then they placed a bee from one group with a different group and monitored the group's reaction to the newcomer.

"The most important finding is that the two chemicals are not equal in the way that they are being used," says Breed. In the June 25 NATURE, he and Julian report that bees treated with a single chemical bit and stung newcomers that happened to smell of the other chemical. This indicates that either chemical, presented by itself, could elicit acceptance or rejection.

Bees treated with both chemicals shunned newcomers wearing only the methyl docosonoate scent. But newcomers smelling only of hexadecane gained acceptance, even though group members were expecting the mixture. "If the bee had hexadecane, the bee would not be attacked," says Breed.

These results imply that bees seek to simplify their chemical conversations, Breed says. To make sense of the chemical chatter that exists in a hive, they follow innate rules that let them cue in on one password over other odors, he explains.

"For the first time, we're actually beginning to dissect the [honeybee's] decision-making process and the cue structure," comments Robert E. Page Jr., an entomologist at the University of California, Davis.

"But just looking at the structure of the compound, we cannot perceive what these rules are," Breed notes.

Even without knowing the rules, beekeepers may be able to use the new findings. Often, apiarists must replace a queen. By treating the new queen and exposing the colony to the same chemical password, they could let bees in the hive know what to expect, making them more receptive to the queen, Breed suggests. *– E. Pennisi*