'Deficit' schizophrenia follows unique path

Schizophrenia usually gets treated as a single disease that spawns several variations on its theme of fragmented thought and emotion. But some psychiatrists view schizophrenia as a shifting mix of psychotic symptoms, such as hallucinations and delusions, and a "deficit syndrome" that reflects disengagement from oneself and others. A longitudinal study now suggests that cases of deficit schizophrenia display a distinct natural history that features an ironic twist.

Over the long haul, patients hospitalized for schizophrenia stand a greater chance of returning to the hospital and sinking into social isolation if they suffer from deficit symptoms, assert Wayne S. Fenton of Chestnut Lodge Research Institute in Rockville, Md., and Thomas H. McGlashan of Yale University. Yet the deficit syndrome also appears to shield its bearers from suicide, they note.

The two psychiatrists present their findings in the March AMERICAN JOURNAL OF PSYCHIATRY.

Researchers have observed a limited ability to experience depression in many people with deficit schizophrenia, which may contribute to their low suicide rate, asserts William T. Carpenter Jr., a psychiatrist at the University of Maryland in Baltimore, in an accompanying comment.

"If [depression] mediates suicide, then patients with restricted emotional experience may be protected from self-destruction," Carpenter writes.

Fenton and McGlashan's data derive from an ongoing assessment of 187 schizophrenic patients an average of 19 years after their admission to Chestnut Lodge, a private psychiatric hospital (SN: 3/21/92, p.181).

At admission, 46 patients displayed an enduring deficit syndrome, which includes lack of emotion, absence of interest in social activities, sparse communication with others, and little sense of purpose in life. These symptoms did not stem from the use of antipsychotic medication, depression, demoralization, or social isolation resulting from psychosis, the researchers hold.

Two-thirds of the deficit patients received initial clinical ratings of substantial thought disorganization or bizarre behavior, compared with one-third of their nondeficit counterparts, Fenton and McGlashan contend.

The deficit syndrome usually worsened in the 5 years after its appearance, with few remissions, they note. After that, it remained largely unchanged.

The large majority of deficit patients spent most of the follow-up period in psychiatric hospitals and rarely landed jobs; patients without deficit symptoms spent less than half the follow-up period in psychiatric hospitals and held jobs for one-third of that time.

No confirmed suicides occurred among deficit patients, compared to 10 suicides in the nondeficit group.

Unlike most people currently suffering from schizophrenia, the Chestnut Lodge patients rarely received antipsychotic medication early in the course of their illness. However, their drug free status made possible a relatively clear look at cases of deficit syndrome, the researchers maintain. *—B. Bower*

A bee and how it sees, that is the question

Sunshine, the shimmer of warm air, and the low drone of bees buzzing from flower to flower all convey the lazy feeling of summer. For bees, however, foraging is serious business and their path is far from haphazard.

Bees use visual landmarks to guide their return to a familiar place. Unlike humans, who can usually recognize a traffic intersection from any corner, bees remember places retinotopically—if they learn a shape with one part of their eye, they can only recognize it again with that same part.

To simplify storage and retrieval of these retinotopic memories, says Thomas S. Collett of the University of Sussex in Brighton, England, bees take their bearings while facing in one direction — magnetic south. Collett trained groups of honeybees to collect sugar from a bowl placed north, south, east, or west of a cylindrical landmark. Most bees looked south when approaching and leaving the food, Collett reports in the March 10 NATURE.

Bees trained to find a sugar bowl located south of the cylinder, however, proved a revealing exception, says Collett. The landmark shows the bees which direction to head in as they search for food. But south-flying honeybees lose sight of the cylinder as they fly. So they look northwest instead—Collett's not sure why they pick northwest—to keep their reference point in view. This shift suggests that bees store memories of landmarks from a preferred orientation, Collett adds, and adopt the same viewing position when using their memory to search for a goal.

Cloudy skies and depolarized light didn't affect the bees' orientation. However, bees placed in an artificial magnetic field looked toward the imposed magnetic south, regardless of Earth directions. "Bees have magnetite in their abdomens," says Collett, which works "as a sort of compass." When the same bees were tested without the artificial field, they simply turned until the scene took up its accustomed retinal position.

"This has been one of the big puzzles about how bees, insects, and even vertebrates learn spatial information," says Fred C. Dyer, an entomologist at Michigan State University in East Lansing. Collett's work confirms that bees are not limited to chance recognition of objects seen exactly as they were before.

More important, adds Dyer, it shows that bees cannot mentally manipulate and identify such spatial relationships. Rather, bees function somewhere in between. "Instead of rotating their minds' eyes, they simply rotate their actual eyes." *—D. Christensen*

New viruses sprout in high-tech plants

From limited experiments, plant pathologists and virologists know that inserting segments of a virus' genes into plants will boost the plants' ability to resist future infection by that virus. However, some researchers argue that, if carried out widely, this practice may pose a risk: The gene segments may recombine with intact pathogens introduced into the plant by insects or other carriers, producing new disease-causing microbes.

To test the likelihood of this, Ann E. Greene and Richard F. Allison of Michigan State University in East Lansing decided to see whether a viral segment inserted into a plant can exist in the proper concentration and location to recombine. It can, they find; what's more, recombination produces several mutant forms of the virus, they report in the March 11 SCIENCE. Additional data suggest that the new form is as pathogenic as the original, says Allison.

The team concludes that "RNA recombination should be considered when analyzing the risk posed by virus-resistant transgenic plants." Not all scientists agree with that assessment, however.

Greene and Allison began their experiment by inserting into *Nicotiana benthamiana* plants DNA replicas of the RNA that codes for the cowpea chlorotic mottle virus' (CCMV) capsid protein. The DNA, however, represented only two-thirds of the protein gene, they report.

They then inoculated these tobacco plants with CCMV that lacked only a small portion of the capsid protein gene, the same portion that they had already injected into the plants. Four of the 125 plants became infected with a recombined form of the virus.

In addition, the researchers spotted in the new pathogen a "marker" mutation that they had introduced into the tobacco plants' RNA. The marker provides "absolute proof the new virus contains portions of the genome from the plant itself," Allison says.

The relatively small number of plants infected by CCMV in this experiment could add up to a lot of plants in the crop world, notes Gustaaf A. de Zoeten, also of Michigan State. It suggests that researchers "need to preemptively do risk assessments" of the likelihood of different agents recombining, he says.

But Bryce W. Falk and George Bruening of the University of California, Davis, argue in an article in the same issue of SCIENCE that virus recombination poses little risk. Plant viruses have always had opportunities to interact genetically, they point out.

"Whatever interactions occur in mixed infections rarely result in new pathogenic viruses," they assert. Pathogens in genetically altered and normal plants will recombine at a similar rate, they believe. Nor do they expect the new viruses to be any more viable than existing ones.

But the rate "at which recombinants occur will be enhanced in virus-resistant transgenic plants," Allison speculates. For recombination to occur, the viruses must reside in the same cell at the same time. This is more likely in the transgenic, or genetically modified, plant, he asserts.

Allison and his colleagues are trying to develop virus-resistant plants that will not produce new pathogens through recombination. "I'm not against virus-resistant transgenic plants," he adds.

— T. Adler

A brighter future for silicon aerocrystals

What would it be like to hold in one's hand a solid, crystalline object composed almost entirely of empty space — a material so sparse in structure that it appears nearly as faint as the air itself?

Such wispy, ethereal masses — almost like a solid, translucent version of beer foam — do exist. Since their appearance in 1931, these aerogels have intrigued scientists, who search for efficient ways to make and use them in a wide variety of electronic and optical applications.

Now, Leigh T. Canham, a physicist at the Defense Research Agency in Malvern, England, and his colleagues report a new method of drying that improves the production and quality of an aerogel relative made of highly porous silicon. Known as silicon aerocrystals, these materials have garnered much interest in the world of computers and electronic communications because of their ability to give off light. With their 95 percent porous structure, such crystals exhibit "strong photoluminesence," making them potentially useful as thin films for optical-electronic devices.

The chemists describe their results in the March 10 NATURE.

When a wet, porous material dries by evaporation, the changeover of the liquid to a vapor can cause stresses and strains that "induce cracking, shrinkage, and even complete disintegration of delicate solid skeletons," says Canham. "Think of the way a riverbed cracks as it dries," he explains.

Using supercritical drying — in which carbon dioxide gas is warmed to 40°C and pressurized to 100 atmospheres — the scientists can remove liquid from the material's pores and avoid the fractural contractions that ordinarily accompany drying.

Compared to silicon aerocrystals dried by evaporation, which showed heavy cracking, the specially dried crystals revealed no cracks when examined with electron microscopes, both scanning tunneling and scanning transmission, Canham and his colleagues report.

While this kind of drying has come into wide use in preparing biological and ceramic materials, it has only now proved useful for making highly porous silicon. Moreover, the supercritically dried aerocrystals showed that they could generate light more efficiently than similar crystals dried by evaporation, the researchers say.

The reason, they contend, lies in the fact that smaller crystal "skeletons" survive the drying process.

Supercritical drying, they add, makes possible efficiencies that "would not otherwise be achievable."

— R. Lipkin

Clementine begins moon-mapping mission

The day before beginning a 2-month survey of the moon, the Clementine spacecraft trained its four cameras on a north polar region of the lunar surface that includes part of a 100-kilometer-wide crater called Nansen. These images, released last week at a Pentagon press briefing, show a section of the crater and its surroundings. Nansen, which lies on the limb of the moon, appears as a shadowy form in the lower left of the UV/visible and near-infrared pictures.

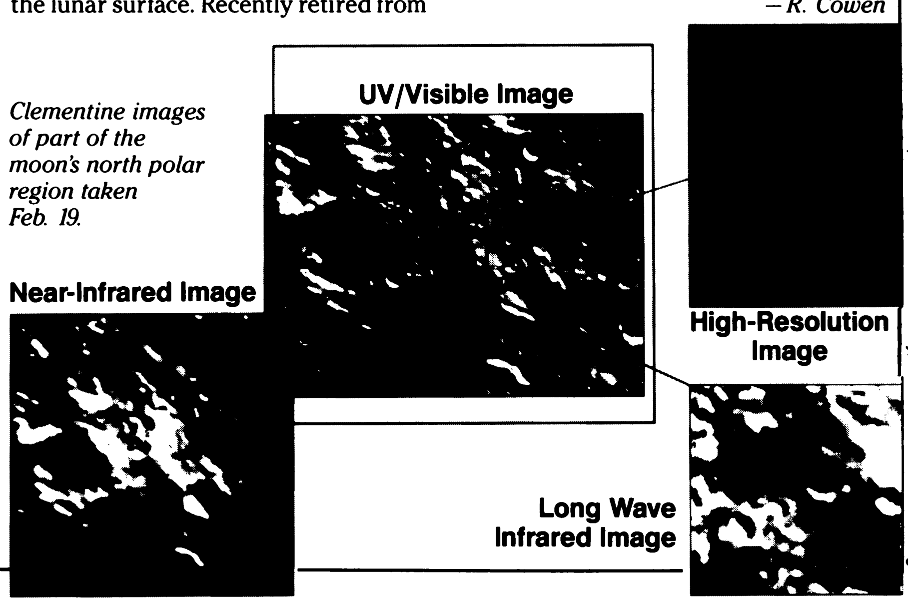
This multiwavelength portrait offers a prelude to the high-resolution map Clementine is expected to generate during its lunar sojourn. The first spacecraft to orbit the moon in 23 years, Clementine will map the entire lunar surface from a polar orbit. In contrast, previous U.S. missions mapped only the moon's equatorial regions.

A joint mission of NASA and the Ballistic Missile Defense Organization (the former Star Wars office), Clementine will test several detectors for the military in a mission expected to include the first flyby of a near-Earth asteroid (SN: 1/15/94, p.40). Though it will use all four of its miniature cameras to image the moon, two of them — the near-infrared and UV/visible devices — will play the major role. These cameras will map the moon's surface at 11 wavelengths, resolving features as small as 200 meters across.

The color map, notes geologist Eugene M. Shoemaker, will help identify the composition of lunar rocks and provide new clues to the geological processes that shaped various parts of the lunar surface. Recently retired from the U.S. Geological Survey in Flagstaff, Ariz., he is helping to analyze the lunar images, some 40,000 of which had been generated as of March 1.

Shoemaker notes that cameras on the Apollo missions examined at high resolution both the front side of the moon and a narrow swath of the back. "But the images we're taking now are going to cover the entire moon. We'll get a global data set of very high photometric fidelity. . . . That's a totally new step."

— R. Cowen



Clementine images of part of the moon's north polar region taken Feb. 19.