crease in brain sugars during the first ten minutes of a pigeon's training. The increase is probably due to the animal's general state of alertness; it is not permanent. Dr. Bogoch, however, found that some sugar proteins do show permanent elevation with learning. Months after their training, pigeons maintain this increased glycoprotein content, and the amount of the increase is related to how well the animals have learned. The better the learner, the more residue in its brain.

Dr. Bogoch views the sugar proteins as "switches" on nerve cells influencing the action of neurons. If they can be synthetically duplicated, he suggests, it may be possible to build many more switches into one brain.

Dr. Heinz Von Foerster, professor of electrical engineering at the University of Illinois, explains how protein molecules on the neuron may alter in response to experience.

He describes the molecules as tiny computer parts, reacting to electrical charges. They are continuously changing in molecular structure from stable to excited energy states and back again. An electric charge comes along—the result of experience—and kicks the molecule into an excited state. Its structure changes, for example, from a stable tetrahedron to a less stable square, allowing the molecule to react chemically and form bonds. In the process, it changes a neuron.

"The whole neuron is a different fellow," says Dr. Von Foerster. "Next time its function will be different."

Without chemical bonding, the molecules will return rapidly to their most stable state. Dr. Von Foerster has calculated that the time required for these flips matches that of neural transmission—0.1 to 0.001 second.

As an alternative to storage, Dr. Von Foerster offers what he calls "cognitive tiles." A tile is the smallest neural unit capable of computing meaning from experience.

From conversations with neurophysiologists, he believes a tile can be as small as a single neuron—in other words, one nerve cell may be capable of sensing meaning. At other times, two neurons, four neurons or an entire network would make up the tiles which are laid out in mosaic patterns.

From recent evidence, it appears that many of these relationships between neurons are already programmed at the level of sense organs. Experience does not always come into the brain as unrelated stimuli; the retina itself seems able to compute relationships.

Dr. Von Foerster rejects the idea that all experience is stored somewhere in the brain. "If people stored all the nonsense they have ever seen, they could never retrieve anything," he says.

WHERE NEXT?

A Soviet Month In Space

Satellite	Launch	Decay (to 5/7)	Period (min.)	Inclination (degrees)	Apogee (mi.)	Perigee (mi.)	Purpose
Cosmos 210	4/3	4/11	90.2	81.3	232	123	recon.
Luna 14	4/7		selenocentric orbit				moon data
Cosmos 211	4/9		102.1	81.3	958	123	scientific
Cosmos 212	4/14	4/19	88.3	51.6	124	112	docking
Cosmos 213	4/15	4/20	89.1	51.6	157	115	docking
Cosmos 214	4/18	4/26	90.2	81.3	237	123	recon.
Cosmos 215	4/18		91.4	48.4	321	132	scientific
Cosmos 216	4/20	4/28	89.2	51.0	166	123	recon.
Molniya 1H	4/21		720.8	64.0	24861	254	communications
Cosmos 217	4/24	4/24	87.6	62.2	113	93	maneuvering
Cosmos 218	4/25	4/25	orbit too brief for data				FOBS test
Cosmos 219	4/26		104.7	48.4	1083	140	scientific

The only Soviet manned space flight in the last three years, that of Soyuz 1 on April 23, 1967, ended in the death of Cosmonaut Vladimir Komarov. Since then a vigorous program of unmanned tests of spacecraft and equipment has made U.S. space officials expect something big to happen.

The something big could be just about anything. Guesses have ranged from a manned earth-orbital test of the Soyuz moon craft, to a manned space station carrying as many as a dozen men, to a robot spaceship that would automatically dig up and bring back to earth a sample of the moon, to a manned circumlunar flight.

One thing that has stirred the space-watchers recently has been the most active space month in Russia's history. During April, the Soviets made more launches—12—than there had ever been in a single month before by any country. The U.S. had put as many or more satellites into orbit during one month four times in the past, but each time one of the U.S. launches included a military flight in which eight satellites were orbited at once.

Three of the satellites in Russia's high-flying April were of particular interest to Westerners looking for signs of coming manned missions. Cosmos 212 and 213 docked, coasted and undocked in orbit automatically (SN: 5/4, p. 430), which could indicate preliminary success in developing a maneuvering capability for use in rescuing astronauts from orbit, a technique on which the U.S. is still debating. Another probe, identified only as another Cosmos number, carried out maneuvers on its own a few days later, swooping down to only 93 miles above the earth. This is some seven miles lower than the orbit of any United States manned flight.

There have also been reports that Soviet space researchers are developing a new super-booster, though they are not unexpected around NASA budget time.

There were indications late in the month that Soviet tracking ships had been sent to their posts at sea, which in the past has often been a good indicator that a major shot was coming. Almost two weeks later, however, there have been no further signs of an immediate launch, although some observers believe that past Russian statements could indicate a circumlunar flight this month.

INTERFERON

Opening another route

Most of the work to date on the antiviral agent interferon has sought either to find a way to produce enough of the protein for injection, or to find some agent that will induce the body's own interferon production.

Now it appears that a third approach must be investigated—the injection of foreign cells that have already begun to make interferon.

For almost a decade, interferon has hung like the grapes of Tantalus, always slightly out of reach. It was identified in 1957 by Dr. Alisk Isaacs, as the substance responsible for one viral infection's interference with the development of a later arriving virus. Interferon at first was hailed as a potential answer for just about every virus disease known.

Interferon is a chemical produced by cells under attack by a virus which blocks replication of the virus. It is a cell's first line of defense against viruses.

Dr. Lowell A. Glasgow of the University of Rochester School of Medicine in Rochester, N.Y., says his group has induced interferon production in the white blood cells of mice, then transfused these cells into other mice.

The transfusion of these interferon factories, Dr. Glasgow says, provides