But his real problem, he says, is whether "the new generation regards my book now as establishment economics. And that's why in the eighth edition I've worked so hard to get all the smugness out.

"If you are young and believe the system ought to be destroyed and a better system built, just to describe carefully how the system functions seems to take on an air of apologetics. I'm stubbornly unrepentent on that, but there really is an issue there." □

RADIOACTIVE DECAY

A fourth method

Univ. of Calif.

Cerny (r) and team: Proton decay.

Nuclear physics began with the observation that some chemical elements can spontaneously, without ouside interference, transmute themselves into other elements by radioactive decay. Observers in the late 19th century discovered two such processes: alpha decay, in which a nucleus emits an alpha particle or helium nucleus, and beta decay, in which a neutron inside a nucleus turns into a proton, and the nucleus emits an electron and an antineutrino.

Since an alpha particle contains two neutrons and two protons, its emission decreases the atomic weight by four and the atomic number of the nucleus by two. Beta decay increases the atomic number by one.

In 1938 a third method, spontaneous fission, in which certain nuclei split more or less in half, was discovered.

This week the observation of a fourth method of spontaneous nuclear transmutation by radioactive decay, predicted by theory but not before seen, was announced. Called proton decay, it is a process in which a nucleus emits a proton and decreases both atomic number and atomic weight by one.

Besides confirming theoretical predictions that proton decay should exist, the experiments should lead to a new precision in analyzing what goes on within the atomic nucleus.

Proton decay was first observed at the nuclear physics laboratory at Harwell, England, last year, but the result was not considered conclusive. It was then confirmed this summer at the Lawrence Radiation Laboratory in Berkeley, Calif. The work was initiated by Dr. Joseph Cerny, associate professor of chemistry at the University of California at Berkeley, who was on sabbatical in England. There he worked with three Canadian scientists, Drs. K. P. Jackson, C. U. Cardinal and H. C. Evans, and an Oxford University graduate student, N. A. Jelley. Later at Berkeley, Dr. Cerny worked with Dr. R. A. Gough and graduate students John E. Esterl and R. G. Sextro.

Proton decay had been predicted by theorists for some time, but it was not observed until now because it will happen only in nuclei that are seriously deficient in neutrons. Such nuclei do not exist naturally; they have to be manufactured.

In the experiments at Harwell nuclei of calcium 40 were bombarded with nuclei of oxygen 16. In the collision, two free neutrons and a free proton came away and the remaining matter fused into nuclei of cobalt 53m. At Berkeley cobalt 53m was made by bombarding iron 54 with protons. (The letter "m" refers to a metastable state, one in which the nucleus has a large amount of energy and keeps it for a long time instead of radiating it away quickly.)

The cobalt 53 nucleus has six neutrons too few for stability, and this large deficiency means that there is an essentially loose proton in the nucleus. This proton, says Dr. Cerny, is not bound by the strong nuclear force that holds all the other neutrons and protons together. It is held within the nucleus only by a barrier set up by electromagnetic forces and the ways in which the spins of the nuclear particles combine with one another.

The loose proton never has enough energy to get over the barrier, but after various lengths of time, the loose protons in different cobalt 53m nuclei find their ways through the barrier by a process peculiar to the behavior of subatomic particles called quantum mechanical tunneling.

According to Dr. Cerny, proton decay should be very useful to students of nuclear structure. The emission of a single proton presents a much simpler situation than the emission of a four-particle complex in alpha decay or the numerous fragments of spontaneous fission. The mathematical description of the simpler process should be easier to calculate, and that, says Dr. Cerny, will aid scientists "to learn sensitive details of nuclei." □

INSECTICIDE GUILTY

Death of the bees

Dead bees covered the ground in front of hives. Others, paralyzed, took several days to die. Some performed grotesque communication dances on the landing board at the hive entrance, whereupon they were refused admission by guard bees. A few still able to do normal dances made it into the hive. But their body hairs, so precisely adapted for picking up pollen, now carried dusty death to the brood inside. The powerful queen, helpless against disaster, was deposed by swarms of frenzied workers. Soon the entire hive died.

As catastrophe struck the bee colonies, perhaps the most tightly organized of nature's societies, Minnesota beekeepers erupted like a swarm of angry hornets in the direction of the Jolly Green Giant and other large canners. The death of bees in enormous numbers is the result of a recent switch by canning companies, who are the largest vegetable growers, from DDT to an insecticide thought more benign, carbaryl.

It was a bad September for bees in Minnesota. Dry weather shriveled many of the clover and alfalfa blossoms from which bees draw nectar and the bees have ranged ever deeper into the sweet corn fields. Here they got what may have seemed miracle food—carbaryl, applied to check the corn earworm and borer, had been mixed with molasses for adherence to the corn.

There was also a new predator. A small green moth, relative of the cabbage looper, was blown in on winds from the South. The moth seems to prefer the succulent peas of the Green Giant Co. of Le Sueur, Minn., to anything it can find down South. It does not greatly damage pea crops, but does fold its wings and crumple into a pea-sized ball. This protective masquerade has caused it to turn up in pea cans. While local entomologists say the moth is high in vitamins, it distinctly lacks consumer acceptance and pea growers have been using carbaryl as enthusiastically as corn growers.

In mid-October, Minnesota beekeepers met with representatives of three large canneries in the first of a series of meetings that they hope will produce a way to save the bees. More is at stake than honey. Alfalfa is a big cash crop that requires bees as pollinators. So do fruit trees, squash, legumes and a host of other crops that nationally amount to some $1 billion worth of agricultural products a year.

"We think better understanding of the essential agricultural role of bees will persuade insecticide-users to take every step possible to protect these