over the meaning of urban affairs. As Dr. Garrison explains, the word takes in virtually all of modern urban life and deals with deep questions concerning the future of society. In social sciences particularly the hypothetical distinction between basic and applied science becomes shaky indeed. But academics have not accepted this fact, says Dr. Bonnen, and participation in urban research is still controversial on many campuses.

"The academic has never been forced to give up his old beliefs. He has the idea that outstanding scholarship is a distilled essence of theory and abstraction." In fact, says Dr. Bonnen, this has not been true for some time. Universities are very much at the center of a society where power has shifted from production centers to knowledge centers.

Dr. Bonnen believes a change in academic values may be enough to refocus the university without major changes in structure or power. Dr. Corson disagrees. He believes that the university president must persuade departments to shift over some of their power to the administration. "The president must wrack his imagination to find ways to break down the isolation and the stultifying authority of the department," says Dr. Corson. "Not only does the future of the university hang on his ability effectively to put himself in charge, but the well-being of our society increasingly depends on his success."

Dr. Garrison suggests a third tack: restructuring the faculty around cores of knowledge. One move in this direction has occurred at the University of California's Irvine campus where the School of Social Sciences has no departments and only two programs.

One of these is a cross-cultural program focusing on development, both human and economic; the other is a program in formal analysis with the emphasis on mathematics and statistics.

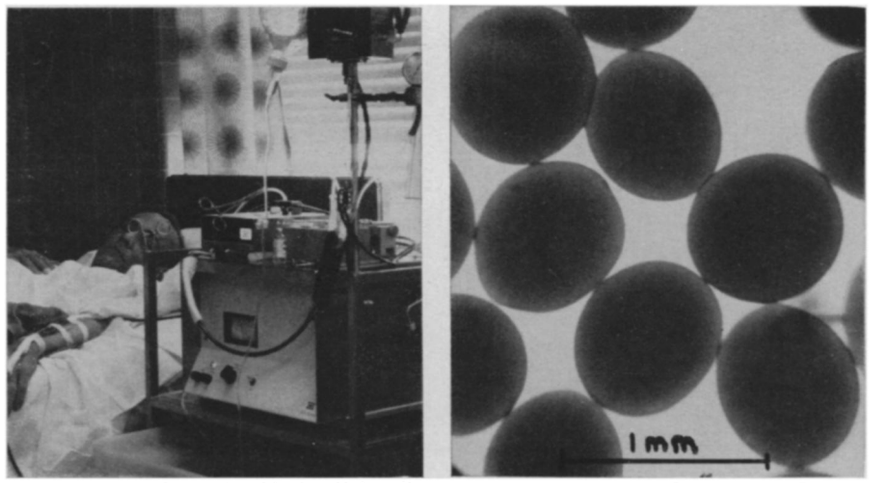
Students may choose either the developmental or analytical approach and are taught by professors from many disciplines. The campus gives its professors flexibility by assigning them a certain fraction of its resources each year. A professor may move from one program to another, taking his financial and secretarial services with him.

Even should the university adapt itself to demands of contemporary society it will be years before the academic world can come up with the knowledge needed for today's problems. Drs. Garrison and Bonnen predict 20 to 50 years.

"We're going to go through a rough, rough period," says Dr. Bonnen. "There will be ad hoc political solutions long before we have social science decisions."

REMOVES POISONS

Edible kidney developing



George Washington University — Case Western Reserve

Cumbersome kidney machines may be reduced by ingestible microcapsules.

Some organs can go awry without any immediate threat to survival. But if the kidneys fail, the body cannot carry on. The kidneys cleanse poisons from the blood, maintain the body's balance of salts and water, and daily flush a quart or two of urine from the system.

Kidney failure kills about 60,000 persons a year in the United States; 8,000 to 10,000 of them could be saved by treatment on an artificial kidney machine. But these machines are cumbersome, expensive and few. Persons who need them must spend two to three nights a week in a hospital, hooked to the dialyzing machine. Because there are neither enough machines nor enough qualified teams to handle these patients, for every one accepted for an artificial kidney program, eight are turned away to die.

A simple, total substitute for the human kidney—or even the bulky artificial one—is a long way off. But scientists at Cleveland's Case Western Reserve University are already developing a substitute that attacks the problem from a different angle: with a capsule that is administered orally and contains a chemical system that can do at least part of the kidney's job.

Dr. Robert Sparks, after three and a half years of research, reports encouraging results from preliminary attempts to perfect an ingestible system that will duplicate the kidney's job of removing poisons, particularly urea, creatinine and uric acid. Dr. Sparks, a chemical engineer, has been working with Dr. Olgierd Lindan, a medical doctor. Animal and human testing of the capsule kidney are planned for the near future.

They use nylon balloons as capsules, Dr. Sparks explains. About 1.5 millimeters, these contain an enzyme called urease, as well as other chemical reactants and resins. When swallowed, they would go to the gastrointestinal tract. There, urea would pass through the capsules' membrane walls and come in contact with the urease which would break down the urea into ammonia and carbon dioxide. Especially formulated resins hold the ammonia inside the capsule, which is finally excreted, and the small quantity of carbon dioxide would be readily eliminated through the bloodstream and lungs.

Dr. Donald Gann, director of Case Western Reserve's biomedical engineering division, predicts that within three to five years it will be possible for persons with sick kidneys to take these capsules, perhaps several times a day, to keep their blood free of poisons.

Though it would not eliminate their need of an artificial kidney, it might make it possible to lengthen the time between treatments, Dr. Gann suggests, from the present two to three nights a week to one every two weeks or so. That would release time on the machines for use by other patients.

Another, and perhaps more immediate, use of microcapsules would be to add them to dialyzing fluid within artificial kidneys.

If poisons could be trapped and handled by microcapsules, the volume of fluid could conceivably be cut from some 100 quarts to 10 to 15 quarts, greatly reducing the size of the machine and possibly pointing the way to development of small machines patients could more readily use at home.

Development of chemical systems that can be built into tiny, ingestible capsules are also potentially useful in eliminating drugs from the body after an overdose.