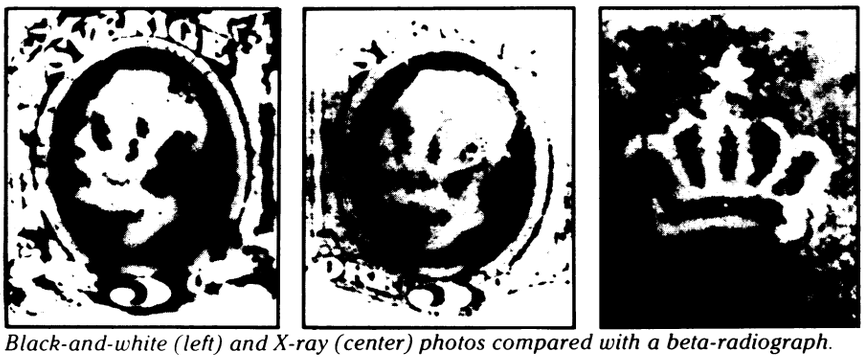

Spitsyn

Black-and-white (left) and X-ray (center) photos compared with a beta-radiograph.

ROC would be less leachable than glass by a factor exceeding 1,000 after 55 days," he said.

Meanwhile, Bancroft observed from the audience that while he had presented his perovskite leach rates in kilogram per square centimeter per second units, Ringwood was reporting his leach rates in grams per square meter per day. After some impromptu unit conversion calculations, Bancroft noticed that at least for one set of perovskite leach rates, he and Ringwood were presenting the same results. "Those are exactly the numbers I reported," Bancroft informed the SYNROC promoter. "I think we won't resolve this," answered Ringwood, moving on to another question from the audience.

Leach rates again were the center of controversy after J.M. Pope of Westinghouse Research and Development Center in Pittsburgh, Penn., reported an "advanced method" for making glass waste forms. The conventional route to glass waste forms involves dissolving nuclear waste oxides in molten glass at temperatures above 1,000°C. In order to minimize foaming, slagging, dusting, the time required to achieve homogenization of this melt and vaporization of the volatile fission products added, researchers have favored borosilicate glass compositions over those that are more durable (and therefore more resistant to leaching) but that require higher-forming temperatures.

In the Westinghouse procedure, glass formers and waste sludge chemically combine before they melt into a homogeneous mixture at temperatures below 600°C. This separation of the mixing and melting operations eliminates several of the usual glass-forming problems without sacrificing use of the higher-melting, more durable glass compositions — silica and alumina, for example.

At least for one of the glass compositions formed by this novel procedure, Pope reports that his colleagues have measured leach rates lower than those of conventional glasses by a factor of 10,000. Following Pope's presentation, however, a representative from the Savannah River Laboratory in Aiken, S.C., challenged that leach rate. Apparently the Savannah laboratories had tested a Westinghouse glass and had come up with a leach rate improved by a factor of two, not 10,000.

According to Pope, the Savannah laboratories had tested a glass with a lower alumina content — and therefore higher leach rate — than the glass he had referred to in his presentation. Comparing the leach rates of the higher and lower alumina glasses is like "comparing French pastry to a damn cupcake," Pope says. But even if the Savannah and Westinghouse laboratories have tested the same glass, there is still no basis for comparison of leach rates. The labs used two different types of tests to measure the leach rates.

The confusion following the presentations of Ringwood and Pope (and evident in other areas of the nuclear-waste disposal field) emphasized the need for the Nuclear Waste Materials Characterization Center (MCC) at the Pacific Northwest Laboratories of Battelle in Richland, Wash. Established by the U.S. Department of Energy in October 1979, "The center has the charter to develop standard tests for the characterization of the components of the waste package — which include spent fuel, waste forms, overpacks, canisters and barriers — and to publish a Nuclear Materials Handbook," Dennis M. Strachan explained at the nuclear waste symposium. Five separate leach tests, for example, have been proposed by the center to study time-dependent leaching of waste forms under various circumstances. While all researchers now use roughly the same method to measure leach rates, "Everyone seems to modify it to suit his or her needs," Strachan says. "You have to standarize these things, and that's what MCC is all about." The test farthest along in the review process, MCC 1, now is undergoing a "round robin" analysis in which 22 laboratories are comparing the leach rates they obtain for three samples using the specifications outlined for MCC 1.

The progress report on the MCC program shined a hopeful light on the nuclear waste symposium; another beam of optimism came from the Soviet Union. Taking a different approach to the problem of nuclear waste, Victor I. Spitsyn of the Institute of Physical Chemistry in Moscow described a method of extracting from radioactive wastes kilogram quantities of the metal technetium — number 43 on the periodic table. The fission of uranium 235 yields about 6 percent of the 212,000-year half-life species of technetium. In addition to inhibiting corrosion, this metal has high catalytic activity in certain organic systems. Moreover, the metal is an excellent source of low-energy beta particles: One square centimeter of metallic technetium emits nearly 2.5 million beta particles per second. As a result, technetium can be used to study the structure and thickness of the thin-layer targets of beta-radiography. In his presentation, Spitsyn demonstrated that while a "soft" X-ray photograph of a 19th century Swedish postage stamp reveals little more than its black-and-white counterpart, the technetium beta-radiograph of the same stamp shows the water mark of the paper.

Extracting technetium from nuclear wastes, of course, is still a rather expensive endeavor; but, says symposium chairman John G. Moore of Oak Ridge National Laboratory in Tennessee, "The fact that the Soviet Union is obtaining large amounts of the material and may find a use for what we thought was a waste — that's significant." □

Harvard bows out of gene-splice plan

Harvard University's brief flirtation with the business end of genetic engineering ended, at least for now, with a decision not to participate in the creation of a new company. The plan under consideration had been for the university to establish a corporation to develop, manufacture and market medical uses of gene manipulations developed in Harvard laboratories. The university would hold shares in the corporation, at most 10 to 15 percent, in return for giving over some of its faculty's research and potential patents for development. The corporation would have had separate facilities and would not have used Harvard's name.

Many faculty members expressed strong opposition to the corporation proposal, which was expected to bring to the university some of the financial fruits of genetic engineering research. The opposition centered on the need for secrecy in commercial ventures, which runs counter to academic ideals of free information exchange. Opponents also envisioned difficulties for the university in fairly handling such matters as faculty salary, tenure and promotion if some faculty members were also the university's business partners. The university would be pressured to make decisions according to commercial, rather than academic, interests.

"The preservation of academic values is a matter of paramount importance to the university, and owning shares in such a company would create a number of potential conflicts with these values," said Harvard president Derek C. Bok in explanation of the university's decision.

Although Harvard will not start a new

corporation, it is by no means free of business ties. It owns stock in many companies, and individual faculty members are officers or consultants for a variety of private concerns. For example, in the same department as Mark Ptashne, who played a key role in the plan for a new company and whose research was to have been the basis for the company's initial project, is Walter Gilbert, who is co-chairman of the board of directors and chairman of the scientific board of Biogen, a Geneva-based genetic engineering firm that plans to open a Cambridge laboratory. The proposed new genetic engineering company is likely to be formed, even without Harvard's direct involvement, with Ptashne and perhaps other Harvard faculty members as major participants.

Had Harvard gone into the genetic engineering business, it would not have been the first university to turn entrepreneureal. For about 20 years Cornell University ran a company that made plane and car safety devices and for a few years the University of Illinois ran a rug-making plant. Most universities that make money from their discoveries and inventions do so, however, by licensing patents to outside corporations, and some schools even have created separate foundations to administer patent affairs. □

The 1980 Lasker awards announced

The $15,000 Albert Lasker Basic Medical Research Award is being shared by four scientists whose pioneering recombinant DNA research has had enormous repercussions on the biomedical research world — Paul Berg, Stanley N. Cohen and Dale Kaiser of Stanford University School of Medicine and Herbert W. Boyer of the University of California at San Francisco. Berg is also a 1980 Nobel Prize winner in chemistry for his recombinant DNA investigations (SN: 10/18/80, p. 244).

The $15,000 Albert Lasker Clinical Medical Research Award is being shared by five scientists who created a vaccine for preventing Rh disease (a disease of blood incompatibility between a pregnant mother and her unborn infant) — Vincent J. Freda, John Gorman and William Pollack of Columbia University College of Physicians and Surgeons, Cyril A. Clarke of the University of Liverpool and Ronald Finn of Royal Liverpool Hospital.

A Special Albert Lasker Public Health Award of $15,000 has been presented to the National Heart, Lung and Blood Institute for a hypertension study that, in the opinion of the Lasker jury, "stands alone among clinical studies in its profound potential benefits to millions." The study showed that patients getting individualized treatment had far fewer fatal strokes and heart attacks than did those not getting it. □

Balloons, enzymes for atherosclerosis

New procedures to treat two potentially fatal heart conditions, atherosclerosis (hardening of the arteries) and thrombosis (clot formation) were presented last week in Miami Beach at the meeting of the American Heart Association. Though the cause-and-effect relationship between the two conditions and heart attacks has yet to be clearly defined, both are associated with blocking blood flow to the heart muscle.

Kenneth M. Kent of the National Heart, Lung and Blood Institute announced the results of a multi-nation registry of percutaneous transluminal coronary angioplasty. PTCA has been used experimentally in the United States since April 1978 to allow freer blood flow in the coronary arteries by pushing fat-rich plaques out of the way. A tiny balloon is threaded into the heart through a long catheter inserted in the groin area. Once the balloon has reached the narrowed area it is inflated, forcing the plaque up against the arterial wall. Since few patients have died, the plaque's fate has not been determined.

Of 804 patients in the registry, about 15 percent had a noncompressible narrowing, while in 83 percent of the successful cases the patients reported a significant reduction in chest pain. About five percent of the cases resulted in abrupt artery closure, requiring immediate coronary bypass surgery. Nine patients died, some as a result of the bypass operation. Until the safety and effectiveness of PTCA is established, the procedure is being performed on patients with only one coronary artery obstructed, a condition that can cause pain but is unlikely to result in death.

Blowing up a balloon within an artery concerns Thomas N. James, the outgoing American Heart Association president. "If you have a crusty tough lesion and you put in a balloon, something's going to break," he says.

Breaking the plaque might be serious, since some researchers believe that it is only when the smooth wall of the plaque is broken that blood clots form. Researchers in the United States and abroad have been working for many years on ways to remove a coronary artery-blocking clot that appears sometime during the rapid stream of events of a heart attack. Variable success rates with clot-destroying enzymes have been reported over the years, but the most impressive results have come from a technique performed only in the past six months.

William Ganz of the University of California at Los Angeles, who already has one catheter to his name, has developed an extra-long catheter that he can thread right up to the clot in a 20-minute procedure. He showed a movie of the catheter nosing right up to a clot and releasing the drug. To the gasps of the audience, the clot dislodged.

Twenty of 21 of his patients are well, he reports. The one failure occurred before he developed the new catheter. The procedure does not, he notes, treat the underlying atherosclerosis. Seven of the patients subsequently underwent coronary bypass surgery after recovering from their heart attacks. The possibility that the enzymes could hurt the heart muscle concerned some members of the audience as well as James, but Ganz reports no effect in dogs or humans. One trick will be needed if the procedure pans out: getting patients to come in as soon as they feel a heart attack beginning, instead of hoping it will go away and allowing irreversible heart damage. □

Brain space: Bird and monkey economics

Within the compact structure of an animal's brain, many complex operations appear to be competing fiercely for turf. Two quite different sets of experiments reported at the meeting in Cincinnati of the Society for Neuroscience indicate that areas of the brain devoted to specific functions are flexible and can adjust to meet the changing needs of the animal.

Song learning, a seasonal activity of male canaries, provides one example. Each spring the males pick up a new repertoire, and Fernando Nottebohm of Rockefeller University reports a corresponding seasonal variation in the male canary brain. In the spring two brain regions, the hyperstriatum vocalis and the robust nucleus, that are involved in song production (SN: 1/26/80, p. 58) are almost double the size they were in the fall. Nottebohm speculates that the extra space is filled with a proliferation of the nerve cells' long, branching processes that are the basis of the brain's communication network.

The enlarged brain space may directly influence the sophistication of learned tasks. Individual canaries of the same species sing a program of 23 to 47 recurrent units or syllables. The size of the hyperstriatum vocalis can vary three-fold, and Nottebohm finds that the birds with the largest song areas tend to sing the most syllables. Female canaries sing only if they are treated with the male hormone testosterone, which induces the song centers in the brain to expand. The number of syllables females sing after hormone treatment is in the same relationship to the area size as in males. "This is the first time that a measure of 'intelligence,' in this case the ability to learn a motor skill, is related to the amount of brain space devoted to this skill," Nottebohm says.

Measurements of the space in a mon-