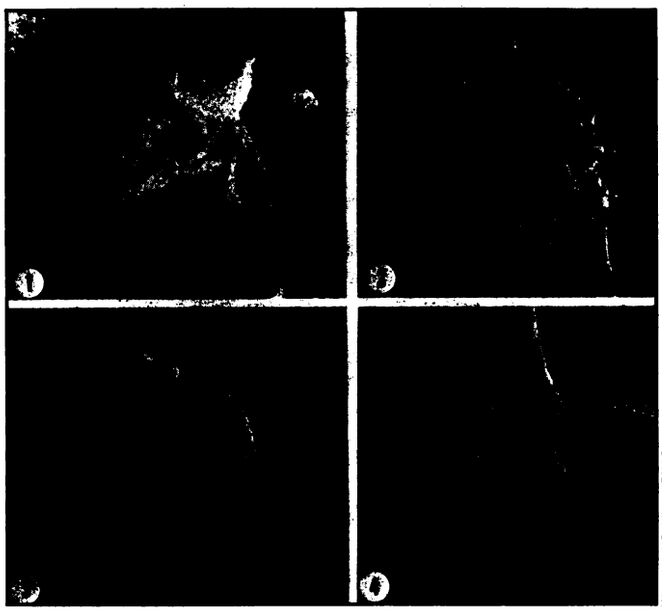
sponse, they found. "Evidence indicates that few people take such pronouncements from psychics or amateurs seriously. On the other hand, when reputable scientists known to be experts on earthquake prediction agree among themselves on the interpretation of data being used to predict a specific earthquake, the prediction will be taken quite seriously by the majority of people."

Haas and Mileti found no evidence to indicate that the first credible prediction of a damaging earthquake will cause panic or anything resembling it. "Nor," they add, "will there be complete apathy."

In an epilogue, Haas and Mileti say some of the more complex issues raised by earthquake prediction will take several years, perhaps longer, to resolve. They suggest prompt and serious consideration. "If we fail to resolve soon some of the more difficult problems, the earthquake prediction technology will come back to haunt us." □

Cancer unfolding: Seeing a cell go bad



Transformation of a normal cell into a cancer cell.

Throughout the world researchers are attempting to solve one of the most baffling mysteries of 20th century science—how a normal cell is alchemized into a cancer cell, one that multiplies without control and ends up killing the body. Slowly but definitively they are unmasking some of the intricacies involved. For instance, dramatic insights into how one cancer virus—the Rous sarcoma virus—turns cells into cancer cells is reported in the November PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES by Eugenia Wang and Allan R. Goldberg of Rockefeller University.

The Rous sarcoma virus causes cancer in chickens, thanks to one gene that it possesses. This gene, known as the SRC gene, is known to trigger various alterations in a target chicken cell. It can cause a loss in cell membrane proteins, sabotage the movement of chemicals through the cell membrane, thwart normal cell growth and movement and even produce changes in cell shape and in the actin (muscle protein) filaments present in cell cytoplasm. Wang and Goldberg probed these latter two changes in detail, using the techniques of scanning electron microscopy, immunofluorescence and transmission electron microscopy.

They put Rous sarcoma virus in the presence of chick embryo cells and shifted the culture temperature so that the virus was able to make the cells cancerous. Using scanning electron microscopy, they observed three stages of change in cell surface during this process.

Stage one began one hour after the temperature shift and lasted two hours. Unique, flowerlike membrane ruffles appeared in the cell's nuclear region (photo 1). The flowerlike ruffles were formed by a direct upward extension of the free cell surface. During this period, the cells generally retained their normal shape.

During stage two, three to twelve hours after the temperature shift, long cellular processes retracted to the nuclear region, leaving numerous retraction fibers around the cell periphery (photo 2). The nuclear region became elevated, and numerous microvilli (tiny fingerlike projections) appeared on the cell surface. The increased retraction finally resulted in the gradual loss of cell shape. By the end of this stage, the cell appeared spindle-shaped and showed many retraction fibers.

Stage three, 12 to 24 hours after the temperature shift, was marked by a gradual conversion of the spindle-shaped cell to a completely round one (photo 3). By this time the cell was covered with small blisters, and the number of retraction fibers and microvilli had diminished considerably. At higher magnification, viruses could even be seen budding from the cell. There appeared to be no preferential location on the cell surface for virus maturation. Occasionally membrane ruffles similar to those of stage one appeared (photo 4).

Using immunofluorescence, Wang and Goldberg could distinguish no difference between the actin microfilaments in the cytoplasm of normal cells and the microfilaments in the cytoplasm of cancer cells until stage two. Then the filaments gradually shortened; their number became reduced. Transmission electron microscopy also revealed a sharp reduction in these filaments by stage three, and some of the filaments appeared to be mixed in with the cell's membrane. These intracellular changes in microfilaments coincided with cell surface changes.

How might these observed changes in cell topography and cytoplasmic filaments come about? Wang and Goldberg suggest that they are probably the result of the influence of some product made by the viral gene SRC. Specifically, the gene probably makes some protein that then attacks a cell's microfilaments. Disturbed microfilaments might then alter a cell's shape, and once its shape is altered, it might no longer interact with nearby cells nor divide and multiply normally. □

Changing of the guard —Part 1

President-elect Jimmy Carter, SCIENCE NEWS learned this week, would soon announce his first major science appointment, nominating ex-Congresswoman Patsy Mink (D-Hawaii) to be Assistant Secretary of State for Oceans and International Environmental and Scientific Affairs. Meanwhile, reliable sources also report that outgoing President Gerald Ford will submit a National Science Foundation budget large enough to reverse a 10-year decline in support for basic research.

Mink served on the House Select Committee on the Outer Continental Shelf and chaired the Subcommittee on Mines and Mining of the House Committee on Interior and Insular Affairs. Although her appointment had not yet been made public at midweek, knowledgeable congressional reaction is generally favorable. Relations between this State Department office and congressional committees have been strained recently and one observer called her selection to the post "a real step forward."

Several pressing issues are expected to greet the new assistant secretary, including law of the sea, offshore mining regulations and oil drilling leases. Congressional pressure is mounting for the United

States to take unilateral action in these areas, and Mink will likely be responsible for coordinating policy between the Administration and the Congress.

SCIENCE NEWS learned that President Ford intends to propose a total NSF budget of nearly $900 million for fiscal year 1978, with special emphasis on basic research. The final FY '77 budget for NSF was $773.6 million, which represented a leveling off of the downward trend of funding for basic research. In constant dollars, the support of this research has decreased 20 percent since 1967, and the new budget proposal, if passed, would be the first clear reversal of that trend.

This budget proposal may help explain the unusually warm farewells President Ford and Vice President Rockefeller received from the National Science Board, which oversees policy for NSF. Norman Hackerman, chairman of NSB, thanked Ford, in a letter, for his "strong support of U.S. science," and wrote to Rockefeller that "your personal attention" was instrumental in establishment of the new White House science adviser post. Hackerman also congratulated Jimmy Carter on his election, and the President-elect replied that "I look forward to benefiting from your support and advice during the years to come."

On Capitol Hill, the swearing in of the 95th Congress also brought about some changes of vital importance to science. The powerful House Committee on Science and Technology lost 5 of 25 Democratic members and 7 of 12 Republican members. These included such staunch NSF defenders as ranking minority member Charles A. Mosher (R-Ohio) and James W. Symington (D-Mo.), plus arch-critic John B. Conlan (R-Ariz.).

New Republican members include Robert K. Dornan (Calif.), Hamilton Fish Jr. (N.Y.), Harold C. Hollenbeck (N.J.), Manuel Lujan Jr. (N.M.), Carl D. Pursell (Mich.), Eldon Rudd (Ariz.) and Robert S. Walker (Penn.). New Democratic members have not yet been selected.

Speculation continued to swirl about who Jimmy Carter would appoint to head the Office of Science and Technology Policy (OSTP). The director of this office is the President's science adviser, and an early appointment is expected. The leading candidate is considered to be Lewis Branscomb, IBM vice president for research, who headed a Carter task force on science policy. □

Toward a national nutrition policy

Since diet is involved in more than half the deaths in industrialized societies, developed countries need national nutrition policies just as much as underdeveloped ones. This is the conclusion of a year-long study of malnutrition by Erik Eckholm and Frank Record of Worldwatch Institute in Washington.

The effects of undernutrition have long been recognized, they say, and many Third World countries have adopted government policies to cope with the problem. But among industrial nations, only the Scandinavian countries have begun to experiment with policies that might modify citizens' diets so as to reduce the incidence of diseases associated with overnutrition. These include diabetes, cancer, stroke and heart diseases.

The Worldwatch report, "The Two Faces of Malnutrition," cites recent evidence that both the effects of eating too much or too little may be more implicated in human illness than previously thought. The authors cite figures, for example, that indicate the minimum protein requirements needed to maintain health may have been set too low. This means that programs designed to improve nutrition for millions of undernourished people in poor countries may have to aim a little higher. Undernutrition is now blamed as a contributing factor in half of all child deaths in Latin America, with comparable figures likely in South Asia and Central Africa.

Even in the children that survive, however, malnutrition apparently contributes to mental retardation. Particularly in the first year of life, when a child's brain grows from 25 percent up to 70 percent of its adult weight, malnutrition can cause irreparable damage.

But in industrialized countries, too, a nutrition strategy can be seen as an investment—what Eckholm and Record call "another step in the evolution of public health policies." Already many government agencies adopt pricing or farm incentive policies that affect people's diets indirectly—but these uncoordinated policies often work in opposition to each other, say the authors. For example, the U.S. Department of Agriculture is now trying to stimulate egg sales, while other agencies try to get people to cut down on their cholesterol intake.

Again, recent studies have illuminated previously unknown health effects of diet. It is now estimated that as much as 50 percent of all cancers in women and one-third of all cancers in men may be related to what they eat. High fat consumption, particularly, has been linked to cancer of the bowel, although the evidence is still circumstantial. Diet and other environmental factors may interact to cause cancer: Heavy alcohol consumption, for instance, may enhance the carcinogenic impact of other agents, such as cigarette smoke. About all an individual can do, the authors recommend, until these diverse threads of evidence are straightened out by further research, is to adopt a "prudent diet," with less fat and more whole grains, fresh fruits and vegetables.

How governments can encourage their citizens to adopt more prudent eating habits, without severely harming farmers or the food industry, may be seen in experiments going on in Norway and Sweden. The Swedish government has adopted a vigorous public education program aimed at cutting down the amount of fats, calories, sugar and alcohol Swedes consume. In Norway, the government hopes to establish a broad array of subsidies, grants, price policies and other incentives to stabilize meat consumption, in favor of fish, grains and vegetables. Eight ministries are involved.

The first step in combating malnutrition—whether from overeating or undereating—is education. The World Health Organization estimates that in Africa, half of the nutritional problems could be solved through appropriate education. In Western countries, more nutrition education is also needed for the public, beginning with doctors. One specific goal, for example, might be to encourage Americans to reduce fat consumption from the present estimated 50 percent to 35 percent.

Should such national nutrition policies be adopted worldwide, say the authors, not only would the general level of public health improve, but there would be less global competition between rich and poor countries for the available food. Rather than being converted to meat, more grain would be available for distribution to a larger number of people. □

Japan completes breeder reactor

Japanese scientists have completed building a breeder reactor, called Joyo, according to the newspaper Asahi. The reactor, located 72 miles northeast of Tokyo, took 14 years to construct, at an estimated cost of $85 million.

Completion of the advanced reactor means that Japan will now join the small group of nations capable of breeding plutonium fuel for use in other, conventional nuclear reactors. Plutonium can also be used to construct bombs. Other nations with large, operating breeders include Britain, France and the Soviet Union. The United States has one small test reactor operating, and its major breeder project is years behind schedule.

A Japanese government policy paper last year called for greater effort in developing breeder reactors. The present reactor will generate 50 megawatts of heat, but a Japanese breeder capable of producing 250 megawatts of electricity has already passed the planning and design stages. Japan now has 7.43 million kilowatts of nuclear generating capacity—using conventional reactors—and hopes to develop 129 million kilowatts capacity in breeders and related reactors by the turn of the century. □