announced a new effort to support and identify scientists suffering repression. The committee selected the cases of eight scientists around the world, including Massera, who have been imprisoned for political crimes. In addition, some 250 members at the Academy's meeting volunteered to act as correspondents to bring pressure upon governments to obtain more information and possibly release. The correspondents will also serve to identify other cases of repression.

The Academy's previous involvement in human rights has been on a somewhat piecemeal basis. Individual members have offered aid to emigrating scientists from time to time. In 1973, the Academy as a body protested the Soviet Union's treatment of Andrei Sakharov. Since then, the Academy has become more concerned with the problem of repression, and last year the Human Rights Committee was formed with geographer Robert W. Kates of Clark University as its chairman.

In the case of Jose Luis Massera, the committee has formally asked the Uruguayan government for permission for his family and friends to visit the imprisoned mathematician. The committee also wants permission for members of the scientific community to determine Massera's health and to be present at the legal proceedings. Massera was a member of the House of Representatives and an official in the Communist party. Both the Parliament and the party were outlawed after a military coup in 1973.

Besides Massera, the committee is also seeking full information on the whereabouts of five Argentine physicists who disappeared last year. Gabriela Carabelli, Juan Carlos Gallardo and Antoni Misetich have been accused of association with guerrillas. Federico Alvarez Rojas and Eduardo Pasquini have disappeared without any specific reason.

Two Russian scientists were also selected by the committee. Sergei Kovalev, who has studied the synaptic membrane, was arrested in 1974 for circulating a Lithuanian Catholic newspaper and sentenced to seven years hard labor. Yuriy Orlov, a well-known physicist and member of the Armenian Academy of Sciences, has played a prominent role in the Soviet human rights movement, joining in the defense of Andrei Sakharov. Although Orlov has been arrested since February, no formal charges have yet been brought against him.

At a news conference announcing the new direction, Kates rejected the idea of "linkage"—connecting the drive for human rights with threats of interrupting American-Soviet scientific exchange. Instead, the committee will rely on the weight of public sentiment. "Publicity is a very positive force," said Lipman Bers, a committee member and professor of mathematics at Columbia University. "I think it's true to say publicity helps, silence kills." □

Estrogen-cancer link faces challenge

Several studies in the last two years have linked a widespread treatment of menopause symptoms to an increased risk of cancer of the uterus lining (SN: 1/3/76, p. 9). This week, two Yale researchers challenged that connection and attacked the methodology underlying many epidemiological studies.

The previous studies of estrogen therapy and cancer are biased by differences in disease-detection rates, hospital referral patterns and clinical susceptibilities, Ralph Horwitz and Alvan R. Feinstein told a meeting of the American Society for Clinical Investigation in Washington. These biases can be reduced by using a different control group, they say. For example, the conventional methods of computing risk assume that cases of cancer will be detected equally among women who are and are not receiving estrogen treatment. Horwitz and Feinstein propose that because women on estrogen treatment often develop bleeding, they are more likely to be given the tests that diagnose uterine cancer.

In their new method, the researchers selected both cases of cancer and controls from the records of women who received one of two medical treatments, either dilatation and curettage (D and C) because of abnormal uterine bleeding or a hysterectomy. All these patients underwent the appropriate procedures to detect cancer of the uterus. From their results, Horwitz and Feinstein calculate that a woman's risk of developing cancer is not significantly increased by estrogen treatment. They suggest that estrogen treatment increases the probability that cancer will be detected, rather than the probability of cancer itself.

Robert Goodman, a researcher at the National Cancer Institute who recently published a study linking estrogens and uterine cancer, flatly disagrees. Because this cancer is relatively rare, affecting about 1.5 percent of women, undetected cancers in a control group just wouldn't have a large effect on the risks calculated, Goodman says. The problem with the Yale researchers' method, he continues, is that they have chosen to study a group of women who have an illness (abnormal bleeding) caused by the same exposure they are investigating. "The question we're interested in is, does estrogen cause endometrial cancer, not does it cause endometrial cancer more than it causes some other condition," Goodman says. □

Success in deciphering human genes

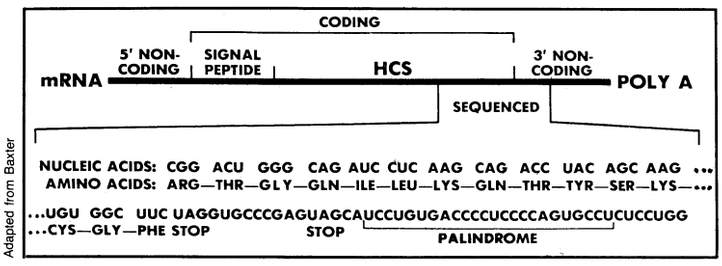
Human genes, like those of viruses and bacteria, are yielding their detailed structure to the onslaught of increasingly powerful analytical techniques. At the annual meeting of clinical research societies in Washington this week, two research groups reported success in deciphering parts of the human genetic blueprint.

Yale researchers have established much of the sequence of nucleotides in genes for the two major protein chains of hemoglobin, the red blood cell molecule that carries oxygen throughout the body. Sherman Weissman, Bernard Forget, Charles Marotta and John Wilson determined the nucleotide order by analyzing messenger RNA, the cellular molecule that copies information from DNA.

The Yale team compared globin messenger RNA from normal subjects with the amino acid sequences from 10 patients with abnormal blood proteins, such as those in sickle cell anemia. "Amino acid substitutions are almost always explained by a single base substitution in a unique normal ancestor messenger RNA sequence," Forget says. However, in a few cases, the researchers observed sequences that suggest the existence of "silent" differences between the globin genes of normal individuals.

The other human gene that has been partially sequenced codes for the hormone chorionic somatomammotropin (HCS). Produced by the placenta, HCS influences maternal fuel economy, making more glucose available to the fetus. John Baxter, Peter Seeburg, John Shine, Howard Goodman and Joseph Martial of the University of California at San Francisco have determined the nucleotide sequence of about one-third of that gene.

Although the amino acid order in the globin proteins and in HCS has been known for several years, the nucleic acid sequence adds important information. Be-



Adapted from Baxter

RNA specifying a human hormone contains two stop signals and a mirror-image sequence.

cause many amino acids can be represented by any of several three-nucleotide sequences, amino acid order does not reveal the exact sequence of messenger RNA or DNA. Second, much of the DNA in a cell does not contain direct information about the structure of protein. For example, the stretches of DNA between genes for proteins may encode important instructions for protein production.

The path is now open to study "just about any gene you want," according to Baxter. A technique he and his colleagues recently developed can help determine the sequence of genes that make at least 2 percent of the messenger RNA in a cell. Moreover, the new technique does not require initial separation of messenger RNA molecules. Instead, all the messenger RNA is copied back to DNA, and that DNA is analyzed by sensitive methods (SN: 4/2/77, p. 216). Baxter identifies the resulting sequences by comparing them to known amino acid sequences.

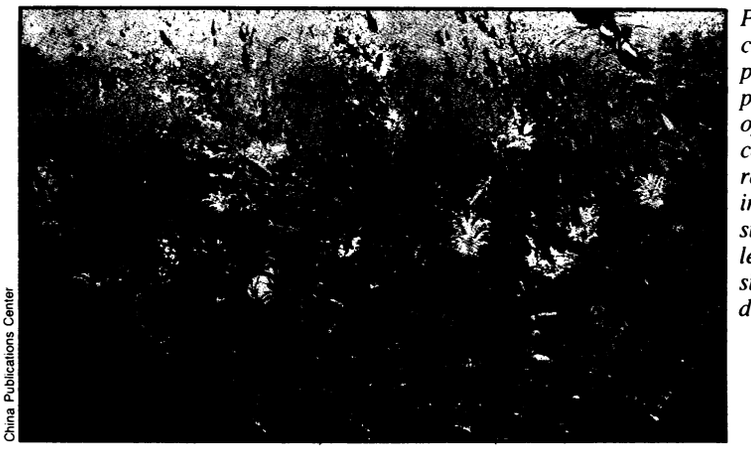
Interesting features of the human gene have already emerged. The region of messenger RNA coding for HCS ends with a stop signal, but only nine nucleotides past it is a second stop, as if a fail-safe device. The messenger RNA of the alpha globin chain also has a second stop signal, 90 nucleotides away from the first. The beta globin messenger RNA is the safest of all, with second and third stop signals backing up its termination, 60 and 87 nucleotides after the first.

Another surprising feature is found in the region of the HCS gene just after the second stop signal. A 24-nucleotide stretch reads identically (with one flaw) in opposite directions beginning at its center. The researchers suggest that this segment could bind a protein important for messenger RNA function. Mirror-image sequences, called palindromes, of a different type are known in bacteria, but such an arrangement of nucleotides has not been described in globin or other mammalian genes.

The work on human genes also demonstrates that nucleotide triplets, or codons, are used selectively to specify amino acids. For example, although there are six triplets that code for the amino acid leucine, one triplet (CUG) specifies more than 80 percent of the leucines in beta globin. The gene for alpha globin shows a slightly different selectivity, but in the parts sequenced so far there is again a striking bias toward using CUG for leucine.

This selectivity seems to reflect the specialized roles of cells, rather than species differences, Forget points out. The distribution of codons in the human globin genes is more similar to that in rabbit beta globin genes (as determined by Argiris Efstratiadis and co-workers at Harvard) than to the distribution Baxter and colleagues find in the HCS gene. The role of selectivity remains unclear, but the researchers agree that more cells and more genes must be analyzed. □

Science in China: Quakes, crops, lasers



China Publications Center

Painting of a commune fish pond by peasant artist of Husien. The carp are fed refuse, including sugar cane leaves and silkworm debris.

Having sponsored 19 delegations of American scientists on visits to the People's Republic of China and hosted 25 Chinese scientific delegations visiting the United States, the National Academy of Sciences has developed its own new breed of "Old China Hands." Three of them summarized their overall impressions about the state of science in China during the Academy's annual meeting last week in Washington.

Using a large manpower base of youthful volunteers, Carl Kisslinger, a University of Colorado geologist, says, the Chinese have a unique opportunity to collect data concerning earthquake precursors, since the country experiences five or six quakes a year with Richter magnitude greater than 6. "China certainly holds the evidence needed for the explication of some of the big questions of earth dynamics."

However, Kisslinger warns that little synthesis of knowledge and few theoretical breakthroughs can be expected from China as long as research there remains narrowly focused on immediate precursors, and the educational system excludes graduate study. Chinese seismologists, he says, now rely almost exclusively on theoretical interpretations of data published in foreign journals. This de-emphasis of theory and the absence of advanced training, he concludes, "will tend to diminish the quality of the work that might otherwise be accomplished."

Meanwhile, some direct exchange of seismic data may help scientists in the two countries make the most of each other's strengths. Kisslinger says the United States has also invited some young Chinese seismologists to take graduate courses here, but so far the offer has not been accepted.

The state of agriculture in China was reviewed by Arthur Kelman, chairman of the University of Wisconsin's Department of Plant Pathology. Since only about 11 percent of China's land is viable for raising crops, he says, the Chinese have become pioneers in intensive agriculture: "The countryside is a garden."

As an illustration of the intensity and efficiency of this effort, Kelman described in some detail what he calls the "ecologically closed system" of a silkworm commune. Leaves from cultivated mulberry trees are picked and fed to the growing silkworms in four-hour shifts. The excrement and debris left by the worms is then placed in fish ponds where improved strains of 3-foot-long carp are raised. These are periodically harvested and the silt from the pond is used to fertilize the mulberry trees. Debris from other crops raised on the commune is fed to pigs, whose droppings are in turn used to support a lucrative mushroom industry.

Many "midlevel" scientists are used to sustain and improve this system, Kelman says. He shares the concern about higher education expressed by the other speakers, but concludes, "I am not sure that the Chinese ought to invest in basic research in biology at a level equivalent to the U.S."

As an example of Chinese work in high technology, University of Illinois physicist Charles P. Slichter described applications of solid-state research in China. Beginning in the late 1950s, he says the Chinese began to develop semiconductor electronic devices, almost skipping the vacuum tube altogether. Now such technology has reached the stage of integrated circuitry like that in the United States in the late 1960s. He concludes, "I think that's truly remarkable."

Laser facilities and applied work on superconductors are also well advanced, he says, but again, the Chinese are apparently having to rely on theoretical breakthroughs abroad. By adopting what he calls a "following mode," scientists in China will probably be unable to catch up to the rest of the world with a lag time of better than three to five years, and then only in a few selected fields. Should policy on advanced study and basic research change, however, he says, China would quickly have a generation of young scientists "as good as any in the world." □